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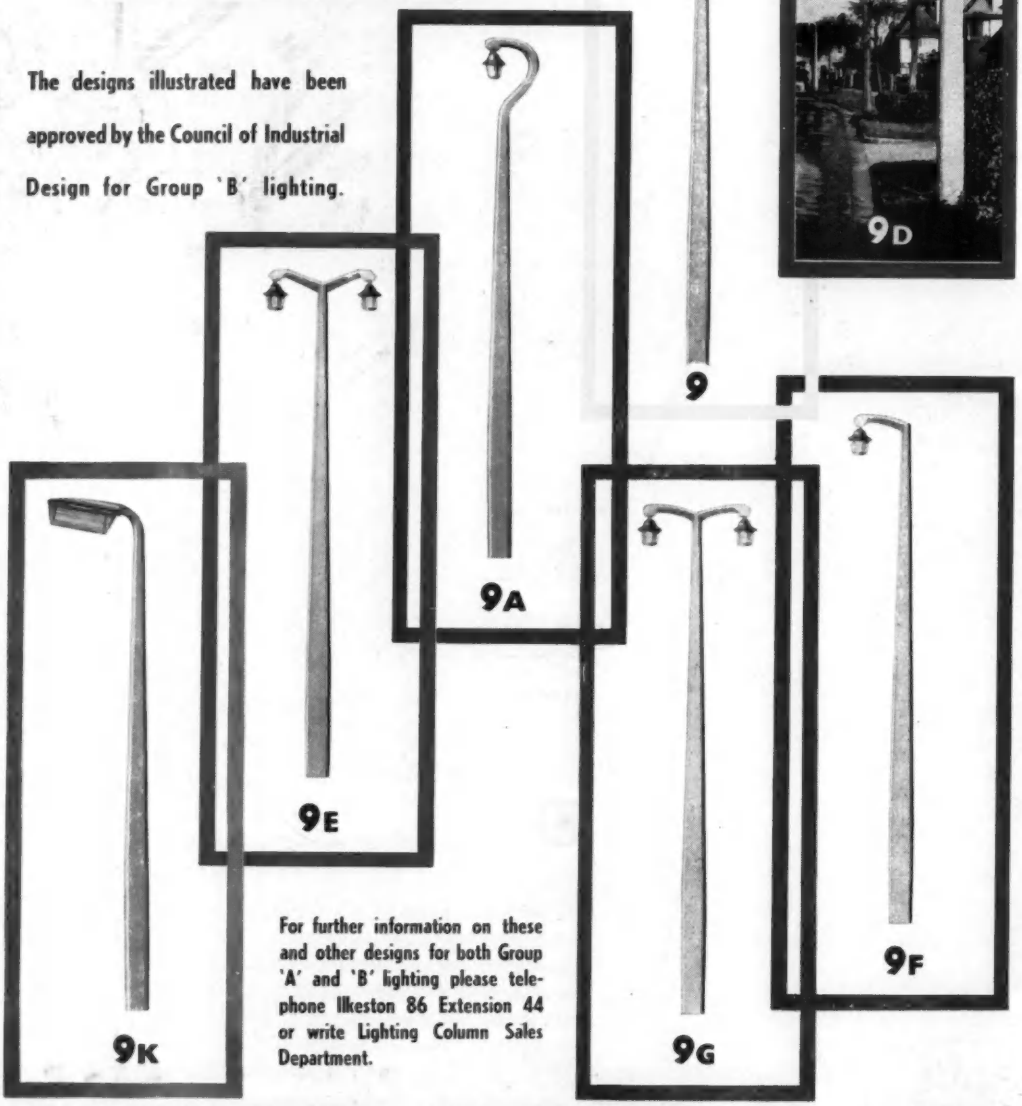
The designs illustrated have been approved by the Council of Industrial Design for Group 'B' lighting.



For further information on these and other designs for both Group 'A' and 'B' lighting please telephone Ilkeston 86 Extension 44 or write Lighting Column Sales Department.

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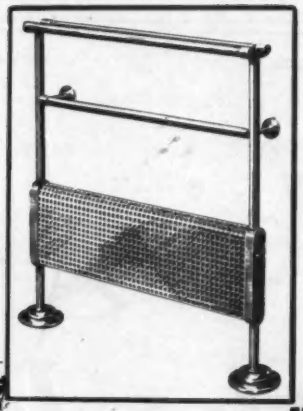
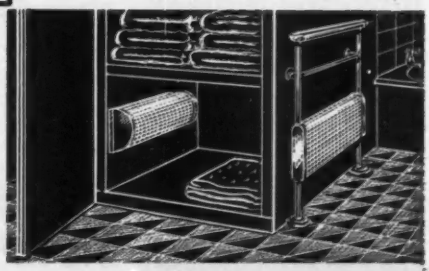
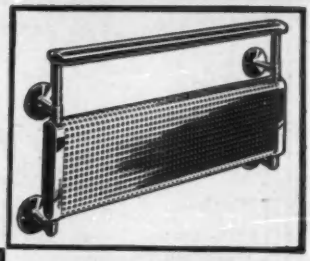


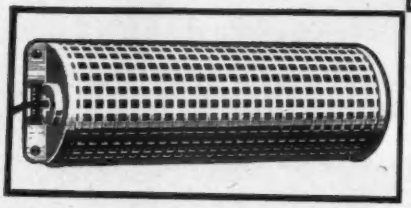
FLOOR TYPE T.D.F.
AIR HEATER AND TOWEL RAIL

Width.....36"
Height.....36"
Projection..... 5"
Loading.....500 watts
2 hours use for 1 unit consumed



Good Companions





WALL TYPE T.D.W.
AIR HEATER & TOWEL RAIL

Width.....36"
Height.....20"
Projection..... 6"
Loading.....500 watts
2 hours use for 1 unit consumed

AIRING CUPBOARD HEATER

Width.....21½"
Height..... 6"
Projection..... 3"
Loading.....100 watts
10 hours use for 1 unit consumed

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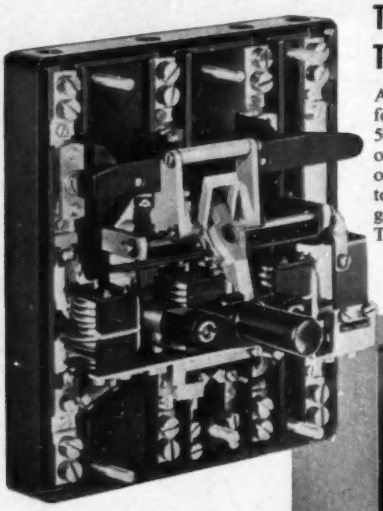
Pamphlet No. ST.2 gives details of Siemens Ediswan Monitored Earth Leakage Circuit Breaker Units for automatic switching off should the earth wires become disconnected or fractured.



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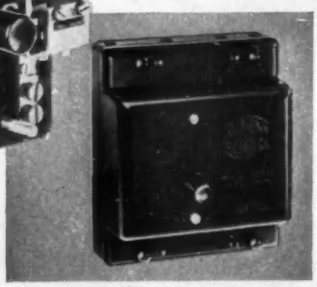

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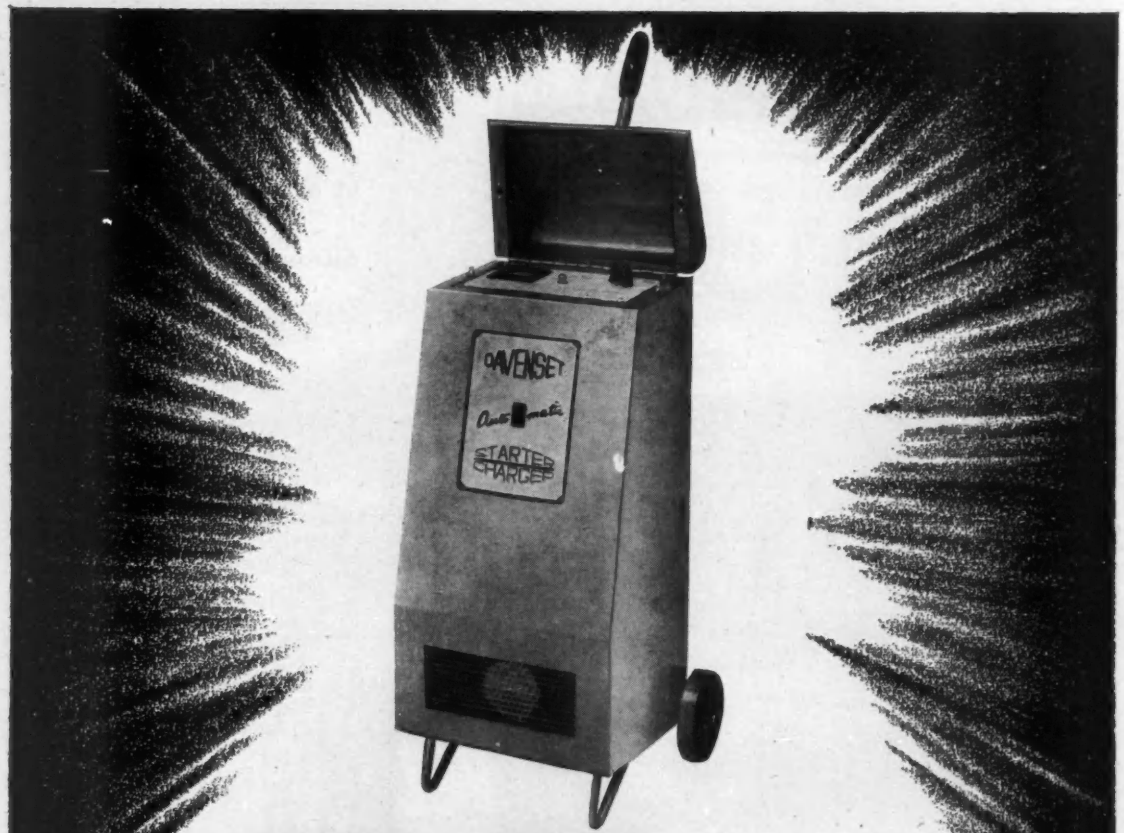

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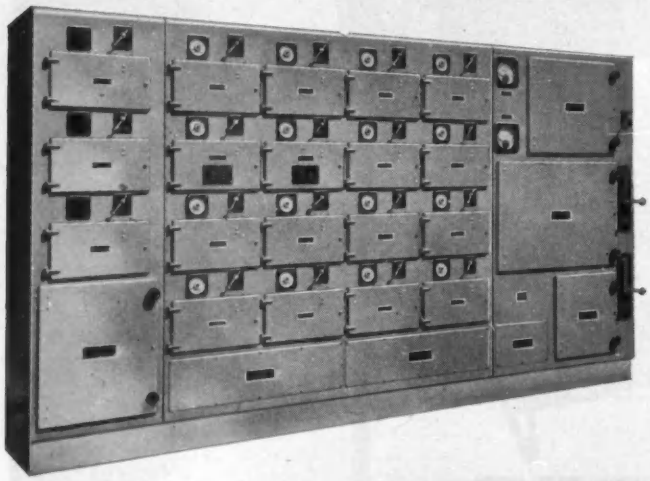
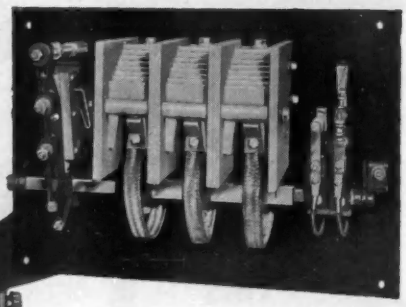
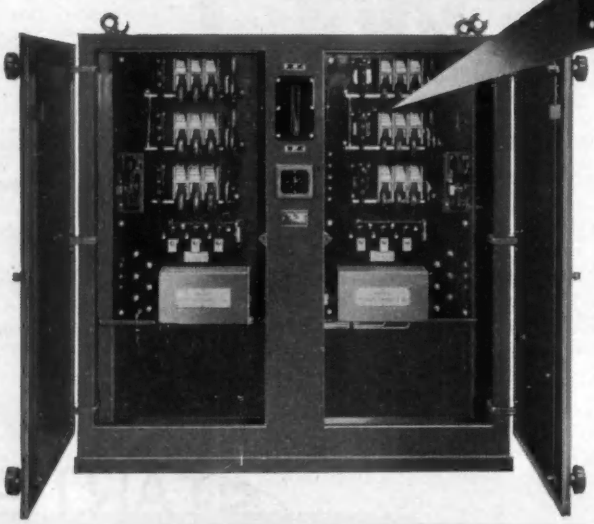


On the left is illustrated a typical Multi-Motor Switchboard with busbar-fed individually isolated starter cubicles



Twin 35 h.p. Star-Delta Cubicle with Central Isolator



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·PERSPEX·

'Perspex' is the registered trade mark for the acrylic sheet made by I.C.I.

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P.63

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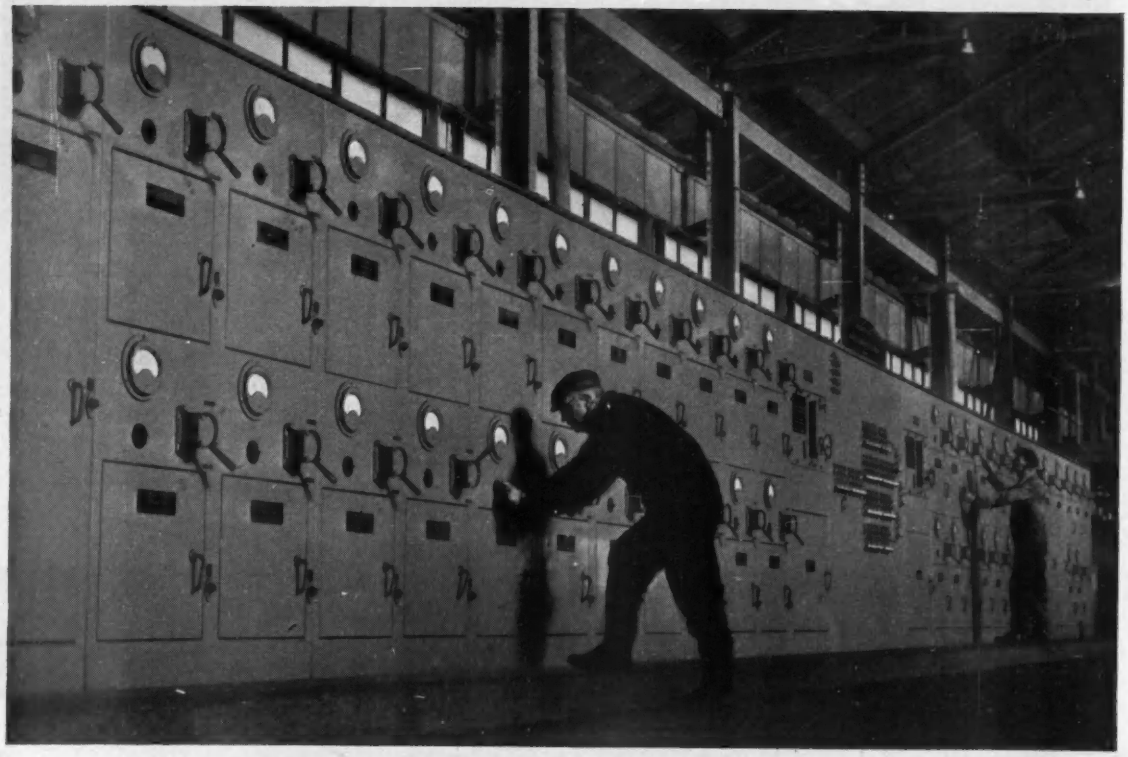

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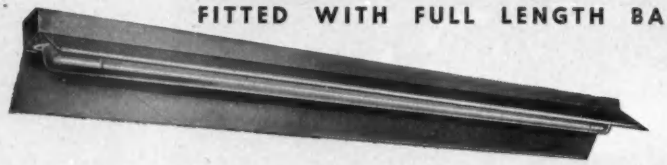

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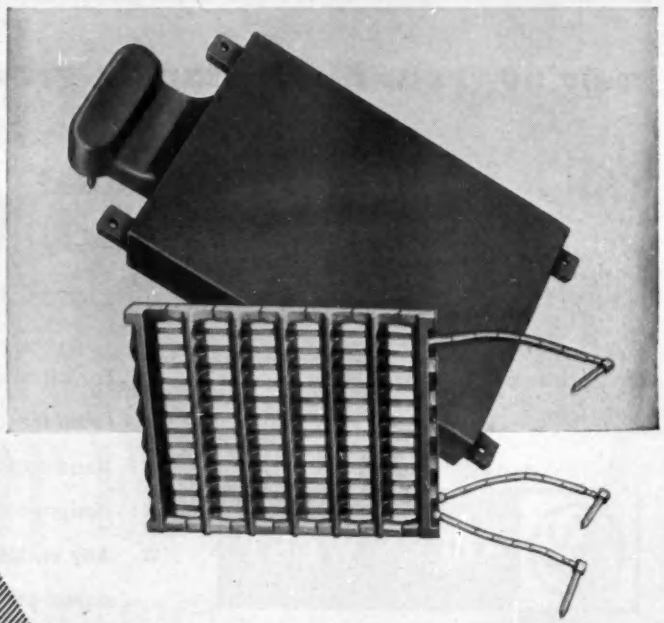

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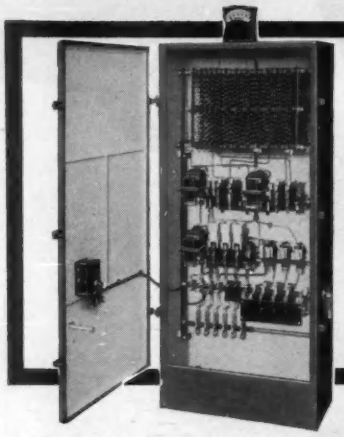

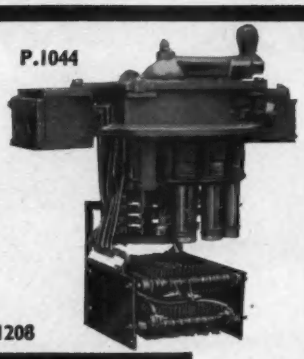

P.1044

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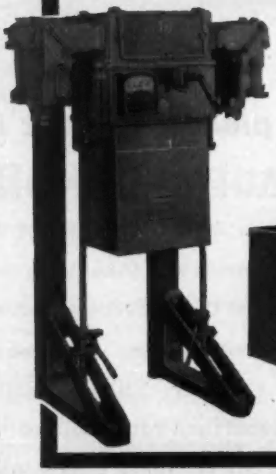

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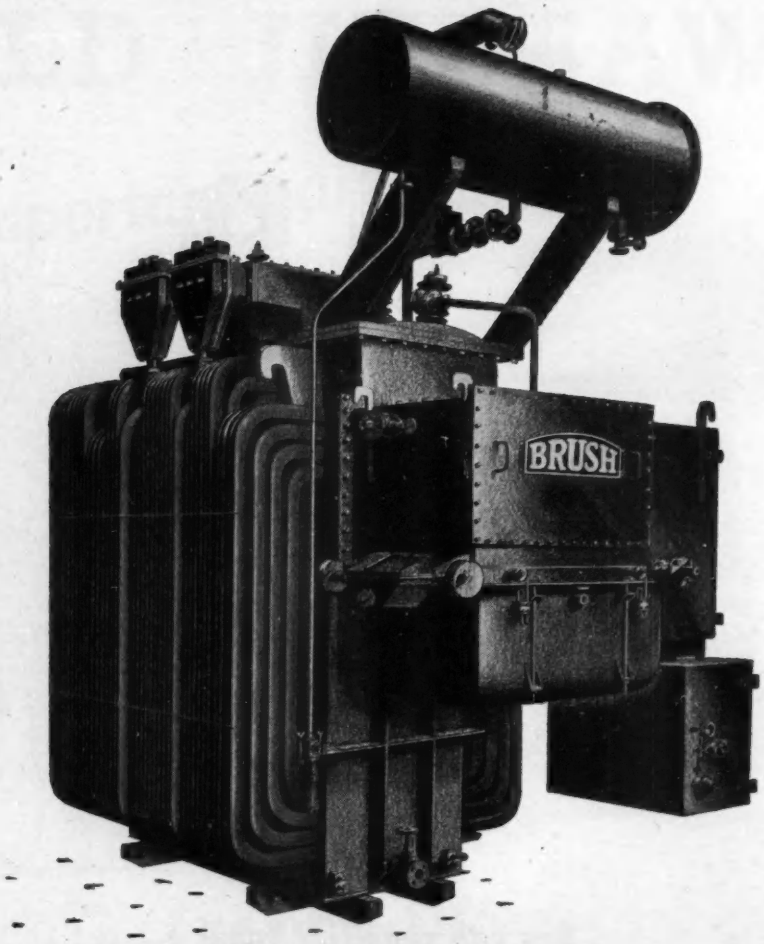

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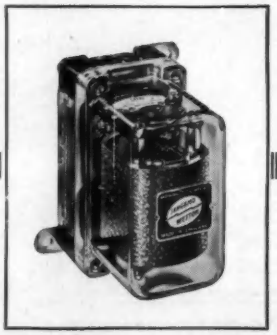

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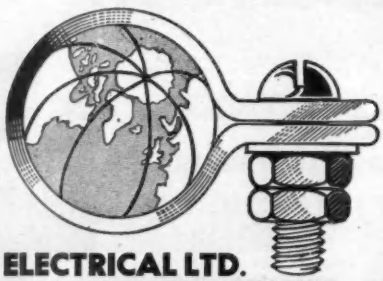

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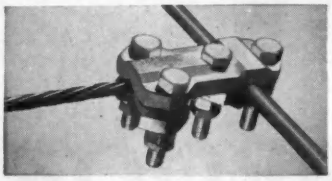

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wood blocks, sunk switch boxes, instrument cases

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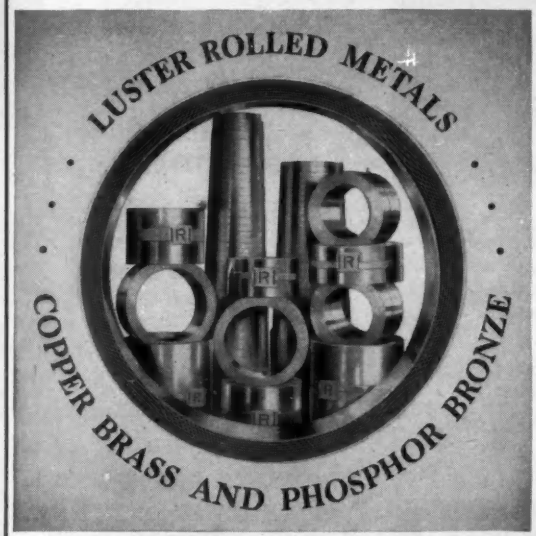

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A Vital contribution to Atomic Power . . .

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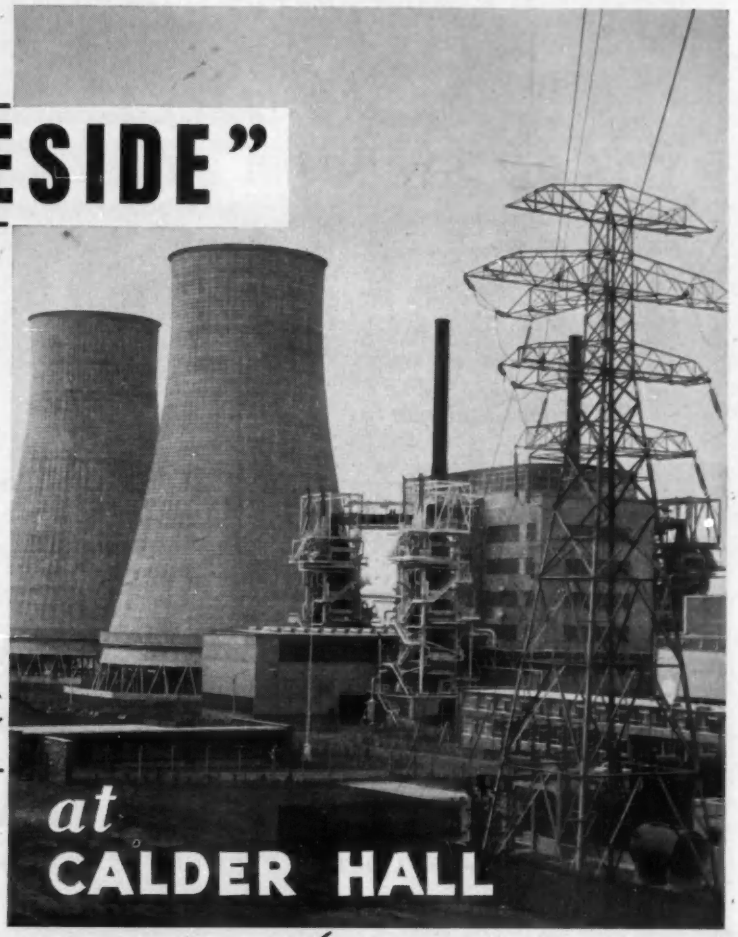

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With the advancement of Atomic Power, cables must play an important part in the efficiency and reliability in the production of Nuclear Energy. Only the best is good enough and Wandleside Cables are eminently suitable.

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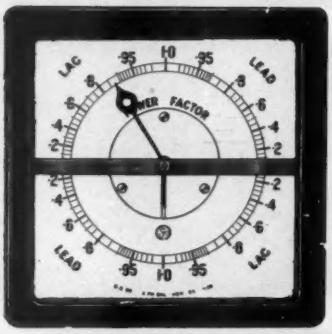

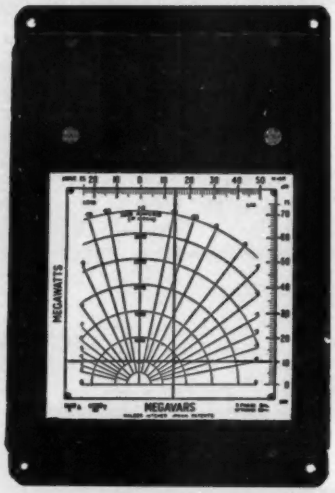

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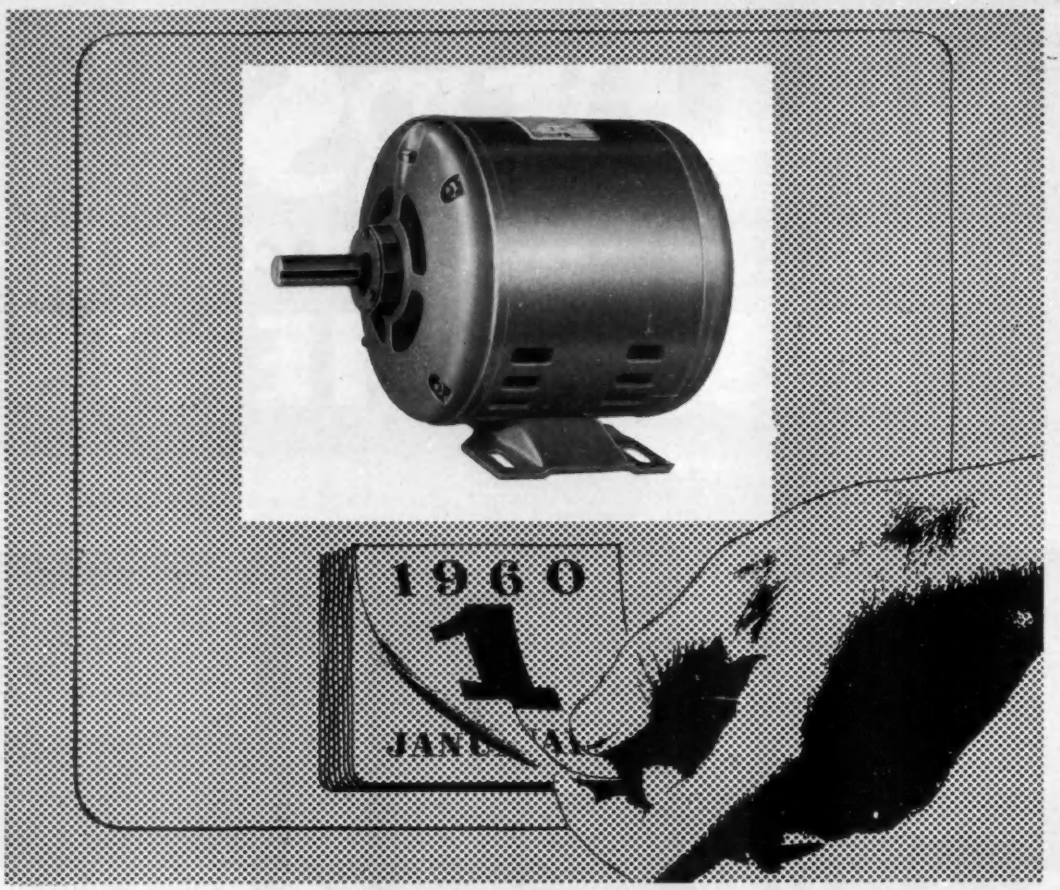

Far ahead of their time!

The new Series 'T' Fractionals

When you have been making motors for decades—as we have at Crompton Parkinson—you find that every now and then your accumulated knowledge carries you far beyond modifications to existing designs. It demands to be embodied in an entirely new range of motors. Such is Series 'T', a range of fractional horsepower motors that has leap-frogged over a hundred modifications and detailed improvements and landed well ahead of other designs.

Here are some of its points

1. Strength. Rolled steel welded carcase supported by continuous full core diameter; short stout endshields of extremely rigid design.

2. Squirrel Cage Rotor: Cast under closely controlled conditions with subsequent heat treatment resulting in maximum torques and uniformity in performance.

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4. Bearings. 'Marathon' Mark III Bearings. These contain enough oil, absorbed in felt specially for the job, for two years' running under normal operating conditions.

5. Cool Running. A new system of ventilation with a fan at both ends of the motor gives the maximum airflow over the windings with a minimum of noise, and keeps the motor temperatures low.

The new motors are available with sleeve-bearings and drip-proof enclosure, running at four pole speeds, from ½ h.p. to 0.95 h.p. Dimensionally, they comply with frame 56 as set out in B.S.2048. Ball-bearing and T.E.F.C. enclosure will be available soon.

Crompton Parkinson LIMITED

Member of the Nuclear Power Consortium :
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MAKERS OF ELECTRIC MOTORS OF ALL KINDS · ALTERNATORS AND GENERATORS · CABLES
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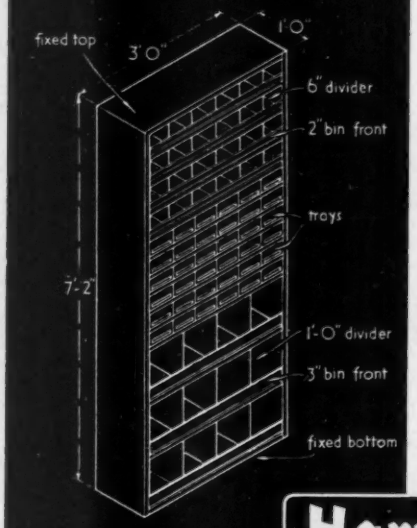
CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2

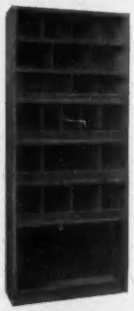
Planned Storage

for small articles



Harvey

Methodical storage and efficient stock control of a large assortment of small items are made easier by the use of Harvey Adjustable Steel Storage Bins.



Assembled from standard components, they provide for a wide range of adjustment to meet individual requirements. The capacities of the bins may be varied to accommodate large or small quantities of articles of different sizes, thus making the maximum use of available storage space.

Strongly constructed to support substantial loads, these bins are fire-resisting, hygienic, and being stove enamelled they require no painting or other maintenance.

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HARVEY ADJUSTABLE STEEL STORAGE BINS

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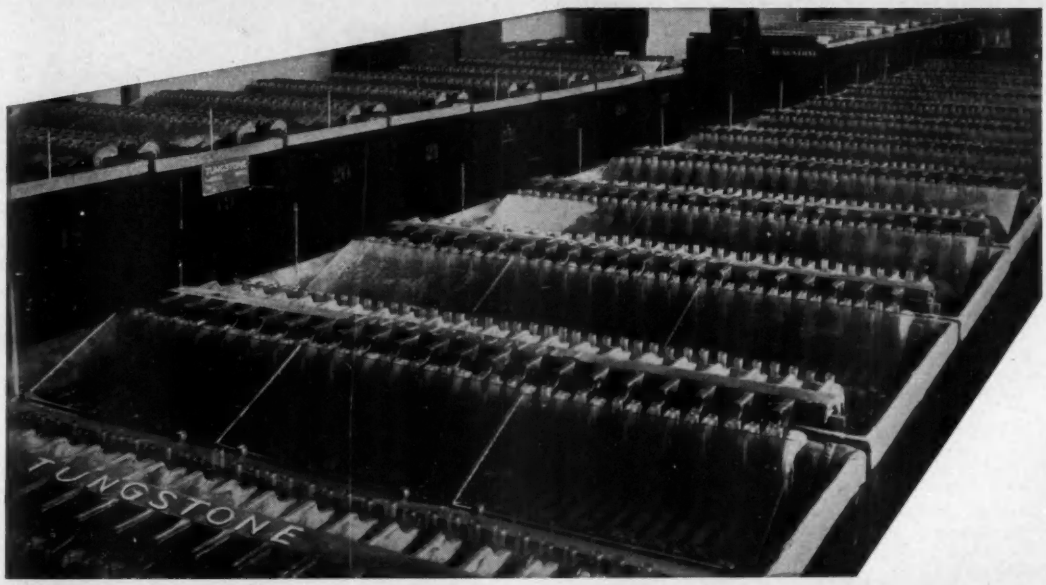

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Glass or lead-lined wood boxes in a range of capacities from 100 a.h. to 5,000 a.h.

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In moulded glass containers with sealed-in lid. Capacity range from 10 a.h. to 200 a.h.

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3 DAYS' FREE TRIAL OFFER

THE FACTORY ACT 1937 SAYS—
In case of "fire," alarms must be sounded which will be clearly audible to every operative throughout the building.

- **To all Factory owners, electrical contractors and others who have the responsibility to decide what type of alarm and how many, we make the above offer of our "M" type siren.**
- **This has been designed to "cut through" all noise levels in factories. These sirens can be supplied to work on any voltage AC or DC.**
- **Easily portable (weight 4 lbs.) and can be carried round to every department and plugged into any convenient lighting point so as to determine the number required for the whole factory.**

WAILERS: To produce the wailing note on the siren, a wailer can be supplied which can operate any number of sirens.

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Our sirens, alarm pushes and all our equipment is in accordance with the "BRITISH STANDARDS CODE OF PRACTICE" and has the approval of Factory Inspectors.

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Ferrule or wire end type: full range of 24 sizes — 1½—250 watts. List VE 190.

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ISOLATOR SWITCHES

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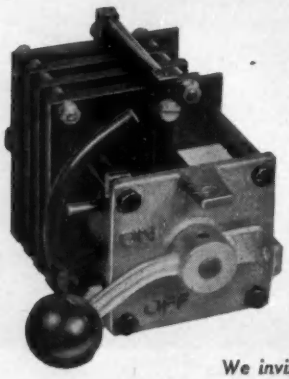

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the *BEST*

Glass Fibre Flat Sheet is

PERMAGLASS

Available in Polyester, Melamine, Epoxide or Phenolic resins, using fine or coarse weave cloth reinforcement as follows:-

GRADE 83/AE *Polyester/Fine Weave*

A general purpose fine weave glass cloth polyester laminate suitable for electrical and mechanical purposes.

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A general purpose coarse weave glass cloth polyester laminate, generally similar to Grade 83/AE but for use in greater thicknesses.

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A fine weave glass cloth phenolic resin laminate with outstanding resistance to chemicals and good electrical properties.

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A fine weave glass cloth melamine resin laminate which is non-inflammable, has good electrical properties and conforms to Def 5000, spec. M.1.

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Maximum sheet size : 70 in. x 34 in. for all thicknesses up to ½ in.
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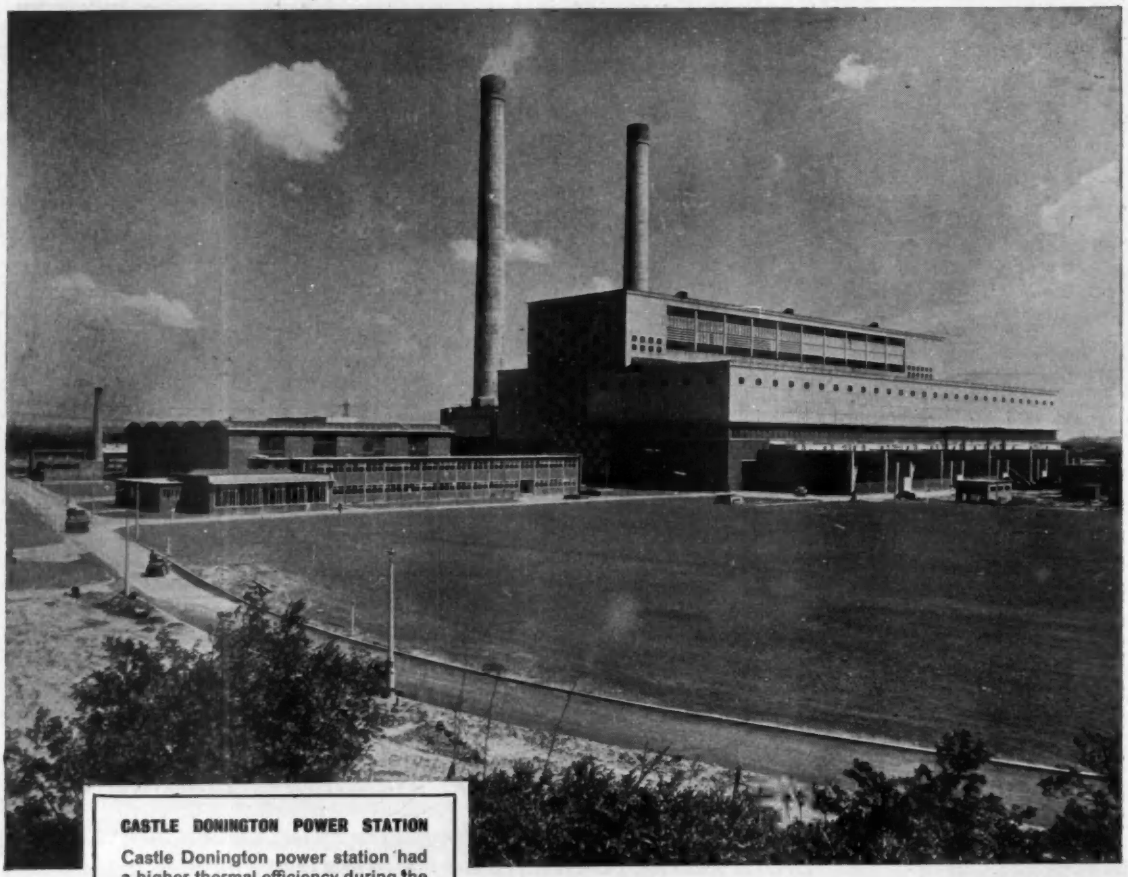

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Castle Donington power station had a higher thermal efficiency during the year ended 31st Mar., 1957, than any other power station in Great Britain. The motors driving the auxiliaries are protected by P & B Golds relays in this and many other power stations of the Central Electricity Generating Board.

C·E·G·B chose P&B Golds protection

P & B Relays give full protection for motors with any starting periods or currents under extremes of ambient temperature.
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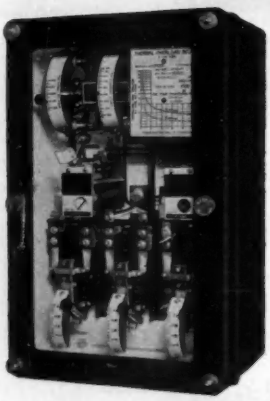

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PROTECTION RELAYS

THE P & B ENGINEERING CO. LTD
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Weatherproof and *Flameproof*

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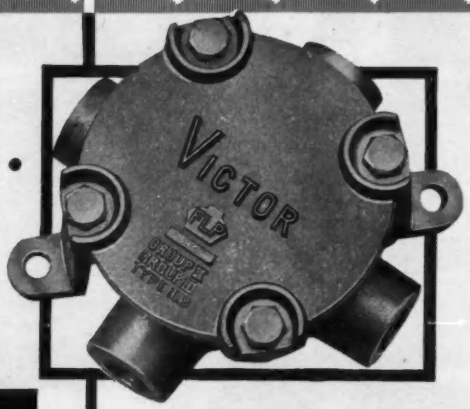
For exposed positions, VICTOR offer a comprehensive range of fully weatherproof-flameproof lighting fittings. By separating F.L.P. and weatherproof joints, a completely hermetically-sealed unit is achieved. Available in several designs to suit virtually every position.



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In the junction box range, similarly independent F.L.P-Weatherproof paths are provided in these, the first fully weatherproofed boxes in the field.

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. . . provides for all cables to be accommodated in one duct with adequate screening between telephone and power cables.

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Patentees, Designers and Manufacturers of Ventilating Equipment and Electrical Conduit Systems
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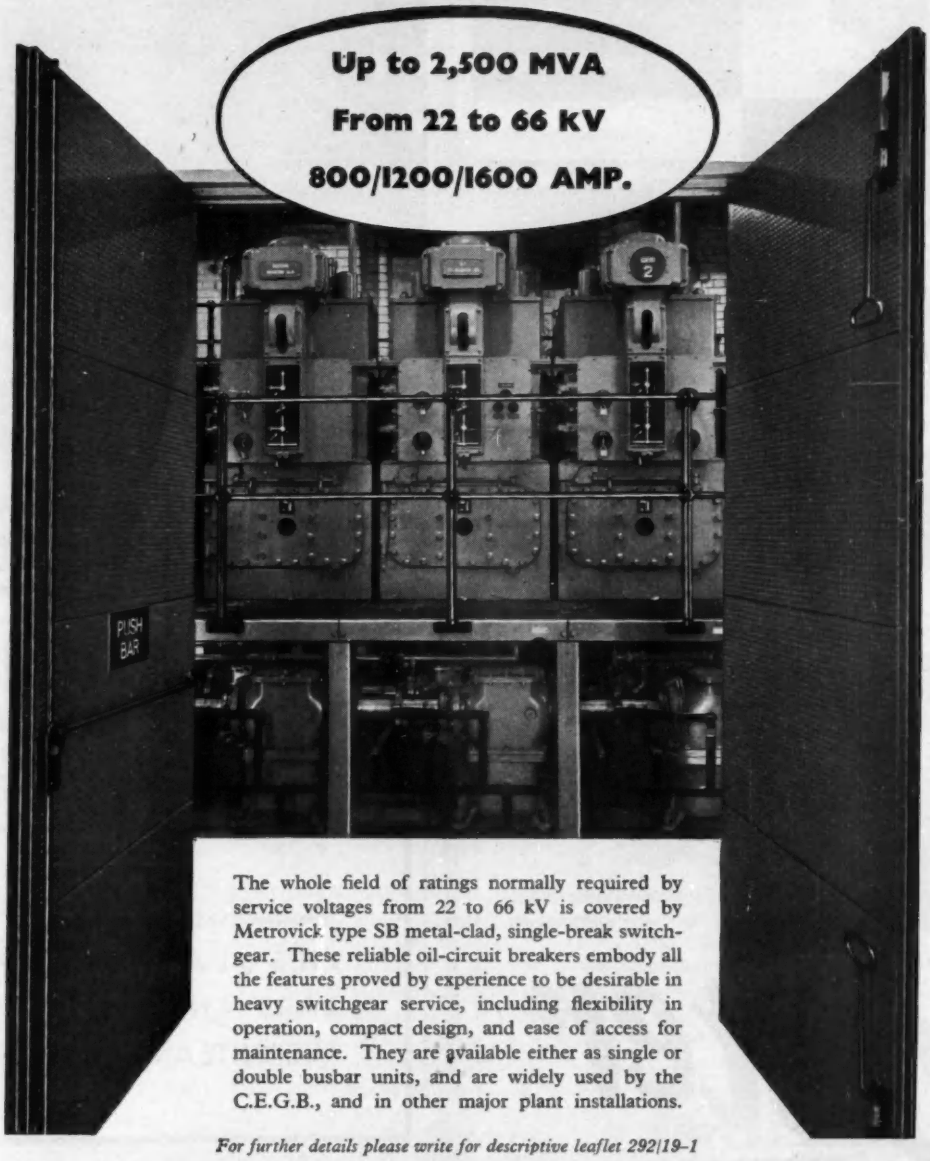
FOR INDOOR SERVICE

Up to 2,500 MVA
From 22 to 66 kV
800/1200/1600 AMP.



The whole field of ratings normally required by service voltages from 22 to 66 kV is covered by Metrovick type SB metal-clad, single-break switchgear. These reliable oil-circuit breakers embody all the features proved by experience to be desirable in heavy switchgear service, including flexibility in operation, compact design, and ease of access for maintenance. They are available either as single or double busbar units, and are widely used by the C.E.G.B., and in other major plant installations.

For further details please write for descriptive leaflet 292/19–1

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ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

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LEADING SWITCHGEAR PROGRESS

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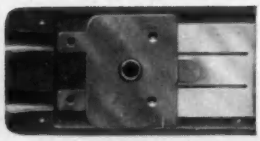

Otter Thermal safety cut-out for Electric Blankets

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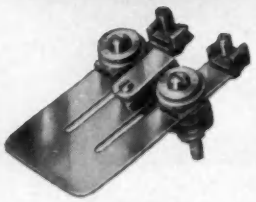

Type K 20 amp. safety cut-out

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The SIMPLEST and most RELIABLE of all safety switches.

Otters press their contacts together to open them with a 'SNAP'

OTTER CONTROLS LTD.

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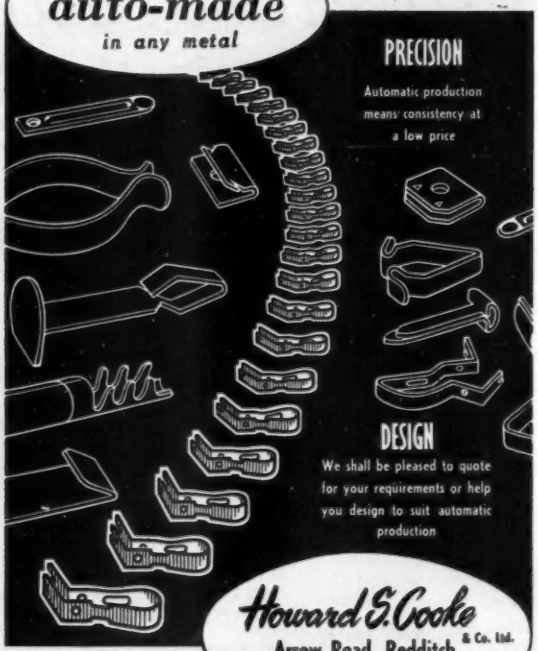
pressings

auto-made

in any metal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We shall be pleased to quote for your requirements or help you design to suit automatic production

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for continuous use in temperatures required by Class 'B' conditions

LEWKANEX

This new polyester-based synthetic enamelled winding wire and strip has been designed to withstand continuous operation in motor windings and other suitable applications at a temperature of at least 130° C.

The insulation offers exceptional resistance to solvents and meets the requirements of BS 1844 with a considerable margin on performance.

a LEWCOS product

STAND 58
R.E.C.M.F. EXHIBITION
GROSVENOR HOUSE
APRIL 14—17

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Everything has to be

CONTROLLED

your language,

your temper, your dog,

your car, your money

and . . . .

s'sh your wife.

. . . . but when it comes to

controlling electricity

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FALCON ELECTRICAL WORKS,
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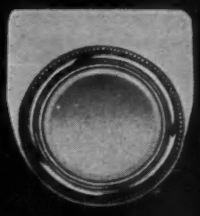
Smartly engineered, in minimum size, ruggedly built, simple to mount and connect, these modern pushbutton units not only look better but will prove their worth in more reliable, more trouble-free operation—longer.



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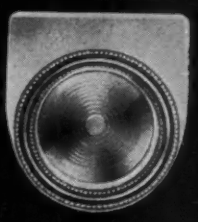
Designed in two styles—the exclusive Pres Test with its built-in testing feature and the standard—both in resistor and transformer types, both compactly designed to match the space-saving feature of the entire line.



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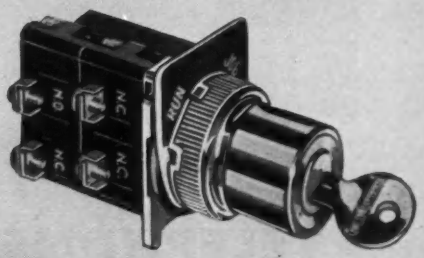
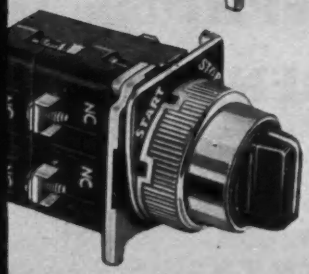
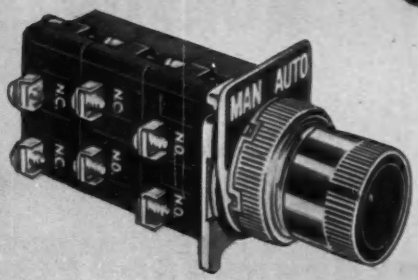
Using the same ingenious and compact contact block as the pushbutton units—include knob and key types. The multiplicity of circuit combinations obtainable is almost unlimited.

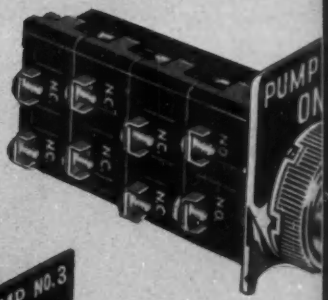
Full particulars from Publicity Department, Bedford

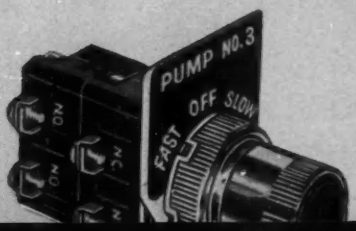
an infinite number of combinations

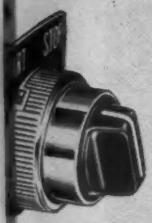


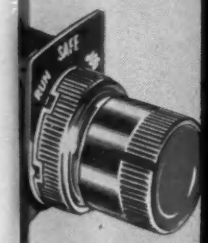












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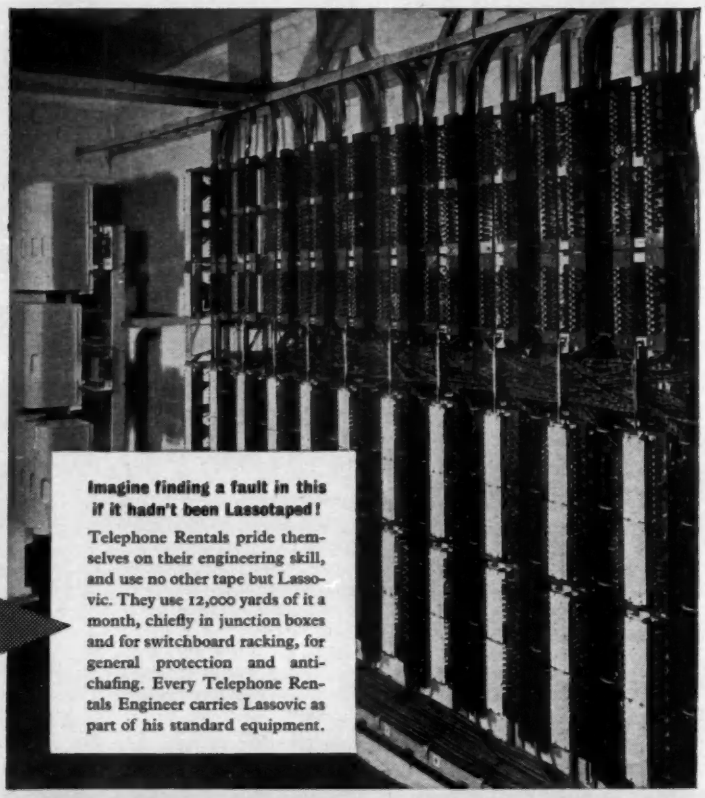

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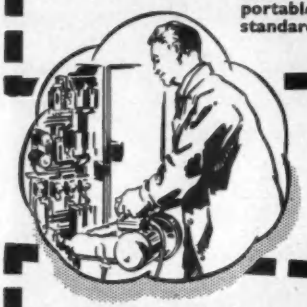
All of the five blowers are instantly converted into portable industrial suction cleaners by the use of standard attachments at little cost.



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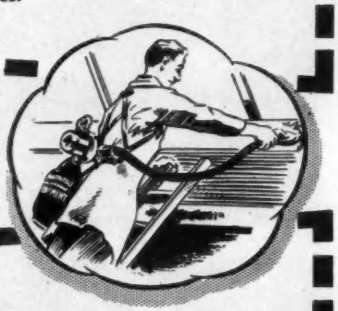

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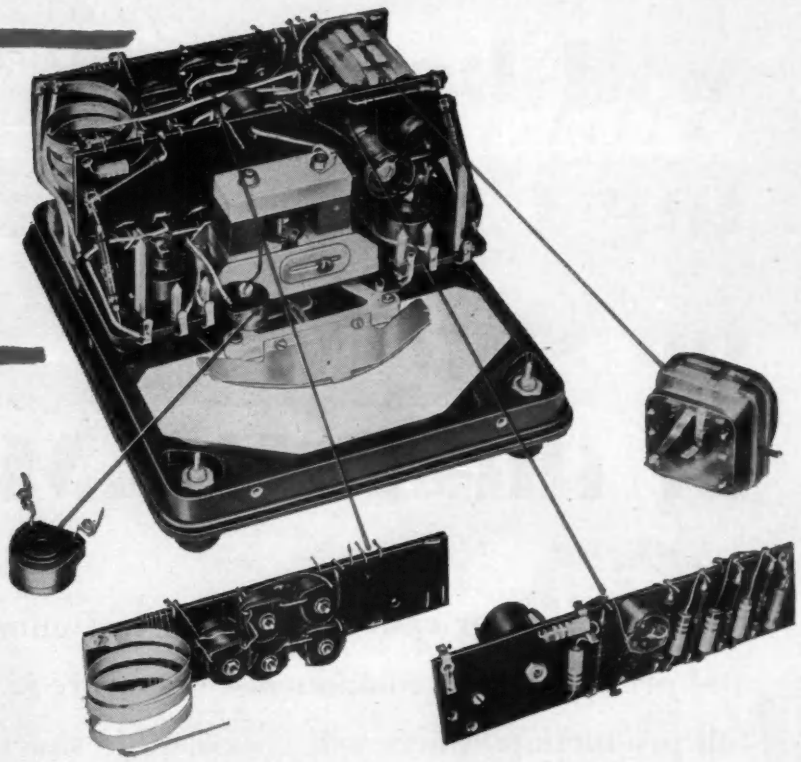

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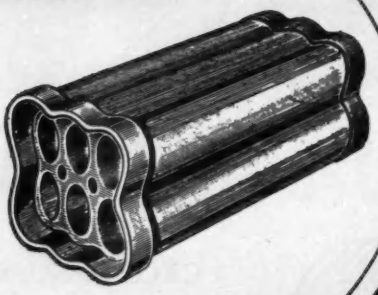

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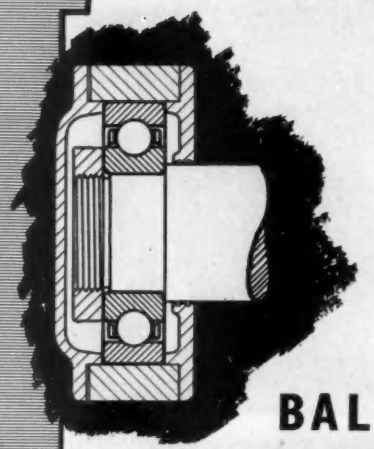

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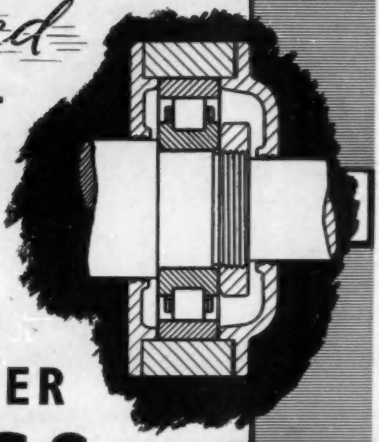

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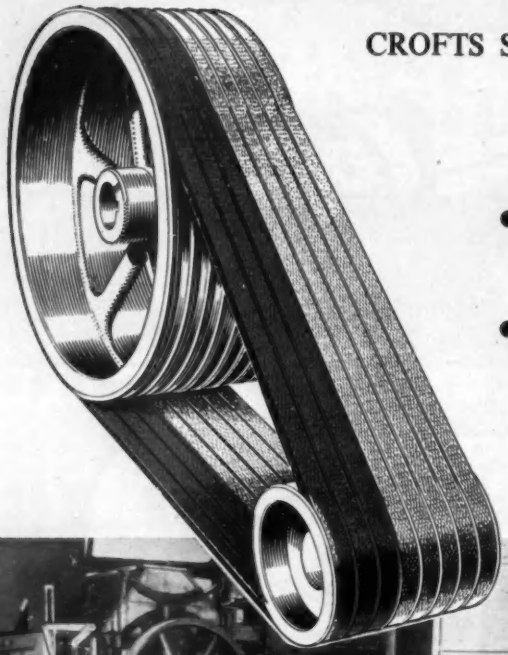

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Standard drives up to 950 h.p. Ratios up to 8 : 1.

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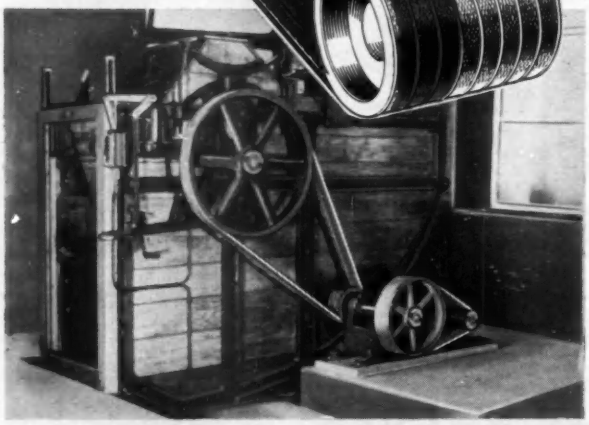

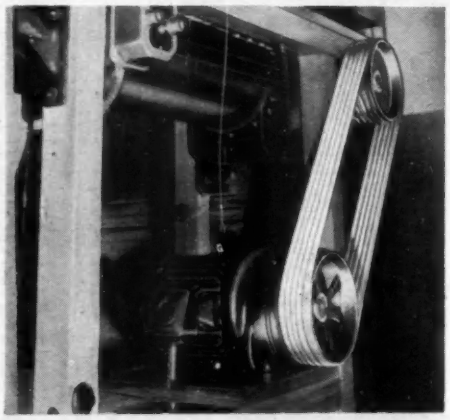

These applications are typical examples of the adaptability of Taper-Flushbush V-rope Pulley drives

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⅜" to 4½" bore from stock

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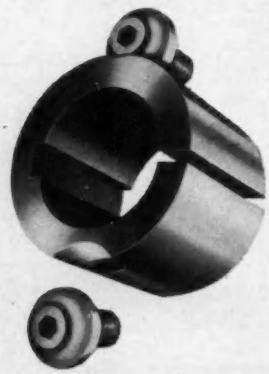

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- interchangeable bushes to fit a wide range of shafts
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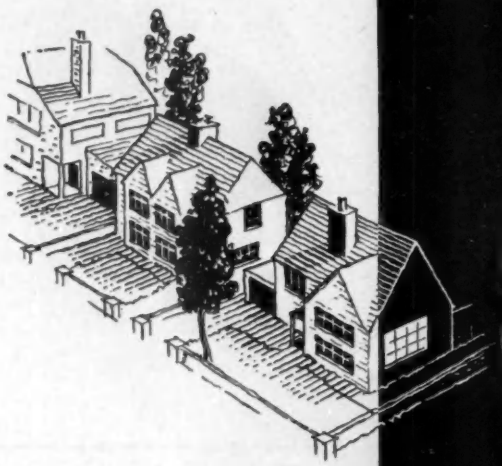

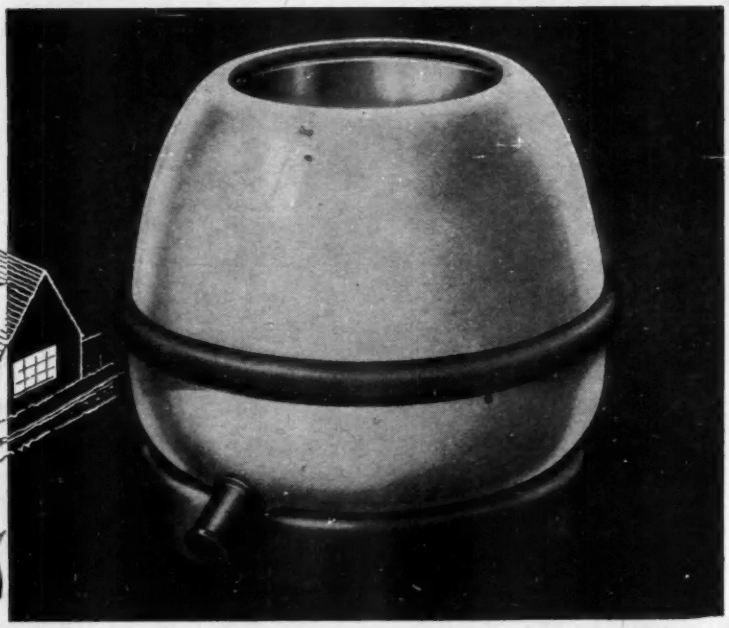

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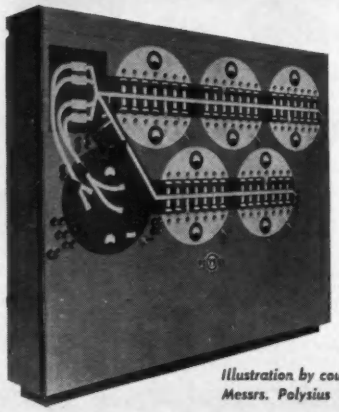

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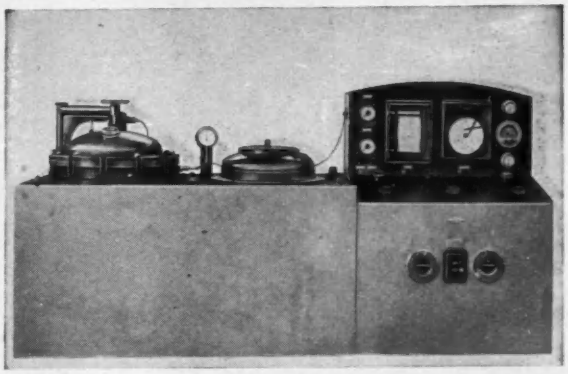

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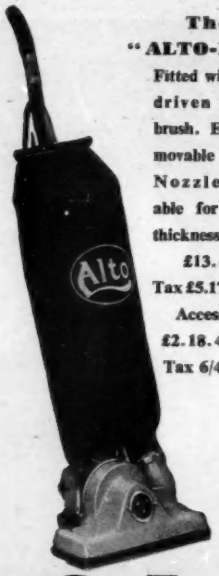

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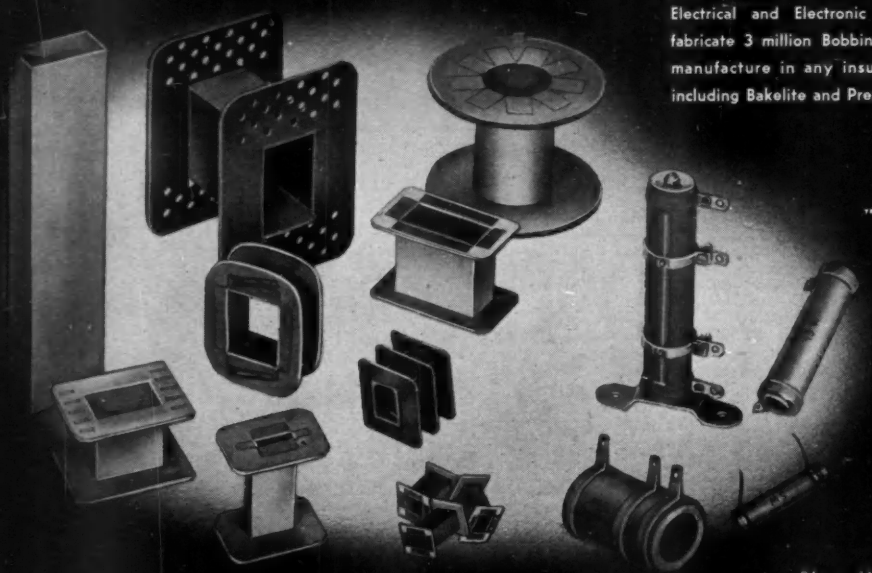

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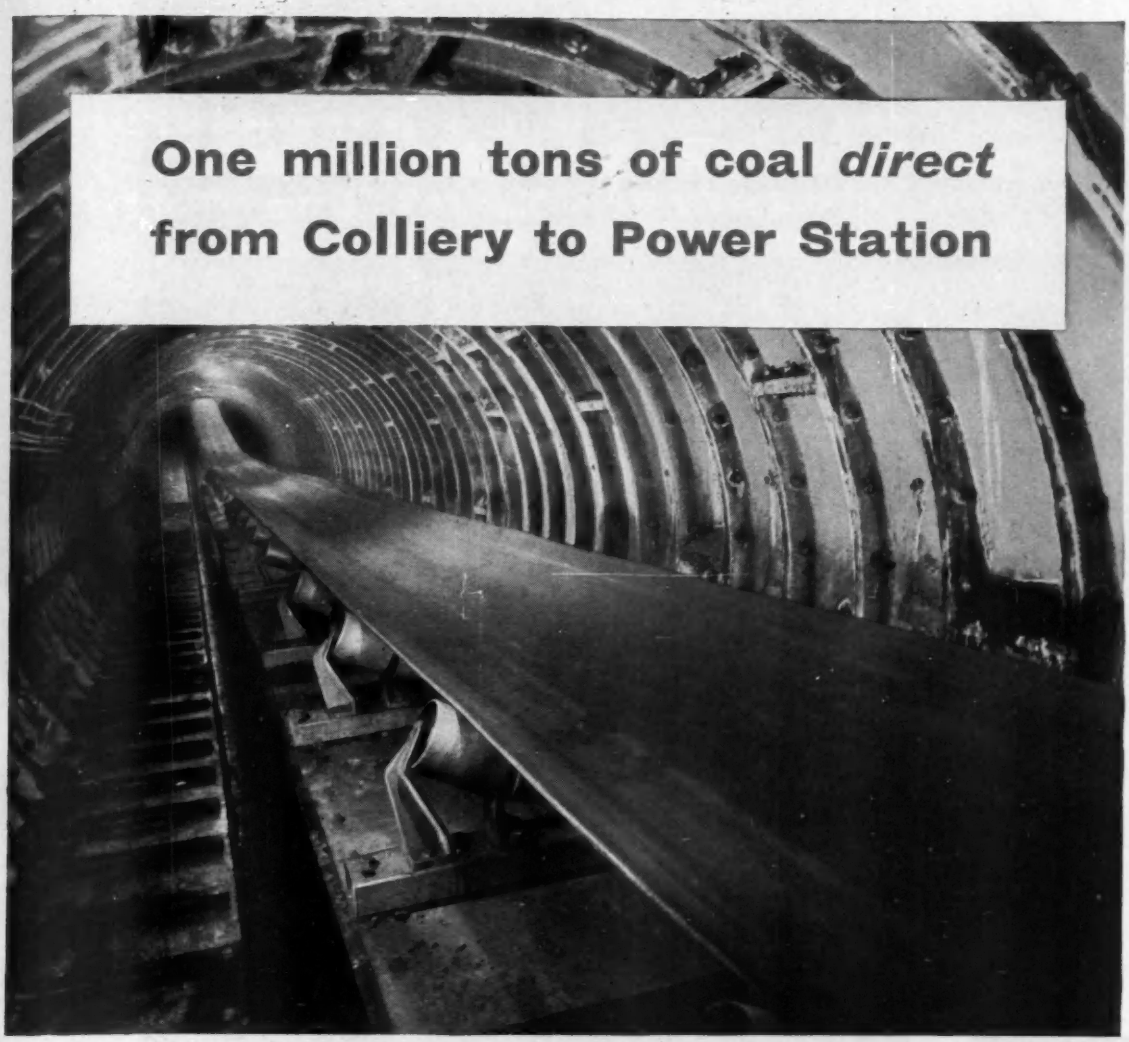

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International Combustion Products Limited supply belt conveyors, gravity bucket conveyors, Beaumont skip hoists and drag scrapers. They are used for handling coal at Power Stations; and in Industry for handling coal and a wide variety of other bulk materials.

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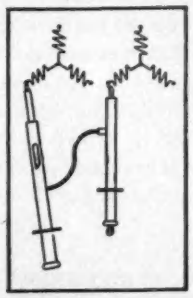

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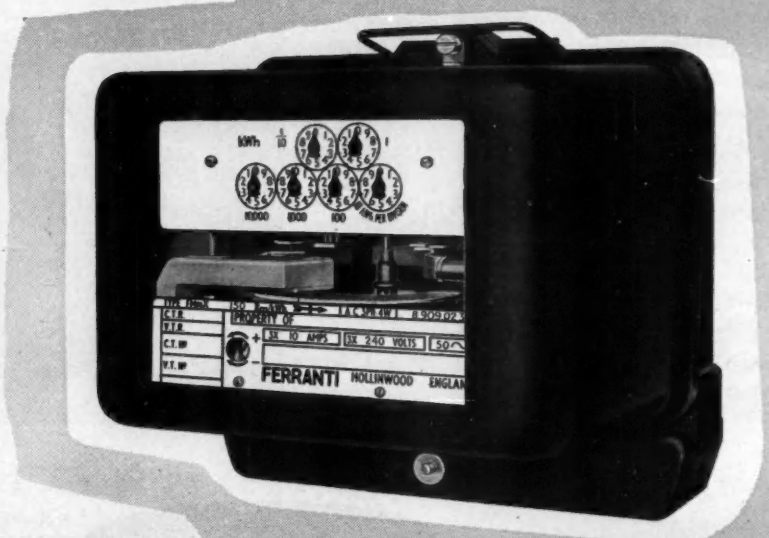

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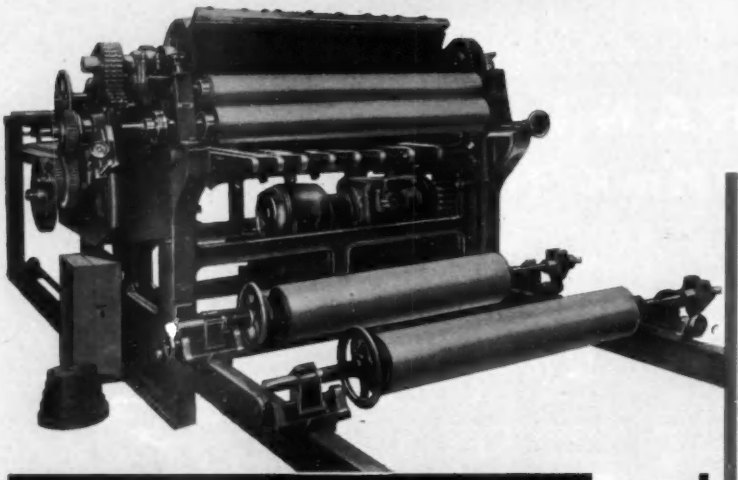

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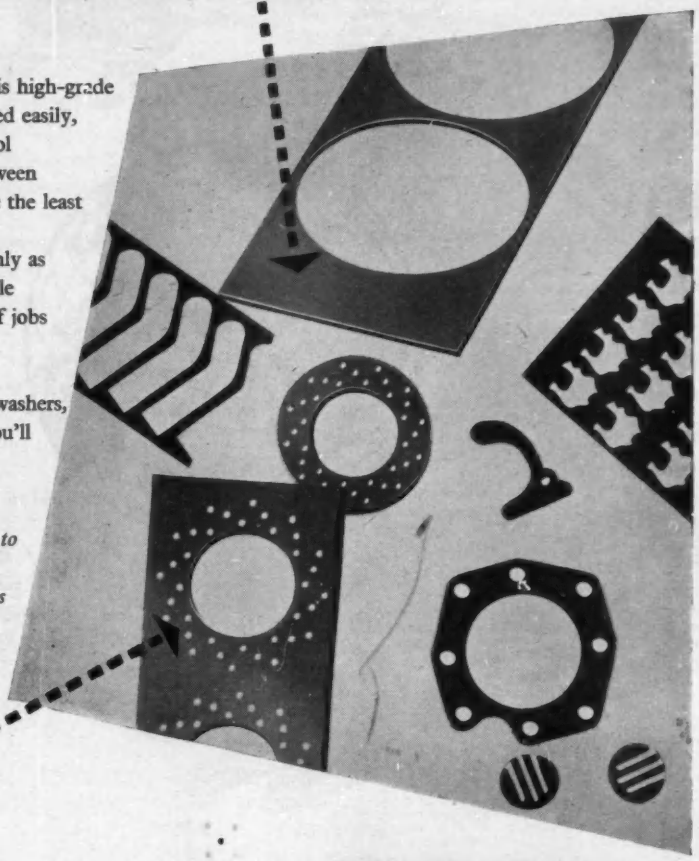

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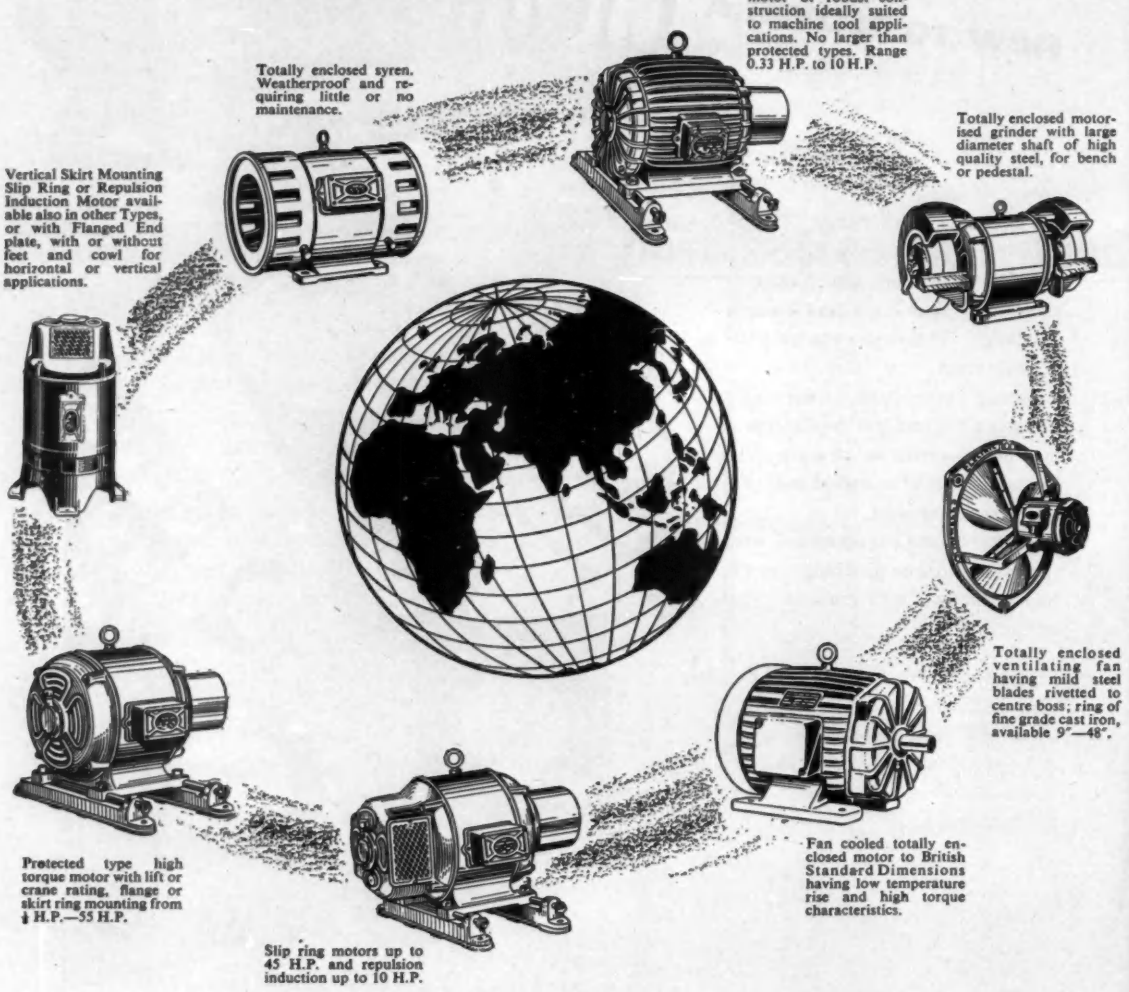
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4 APRIL 1958

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

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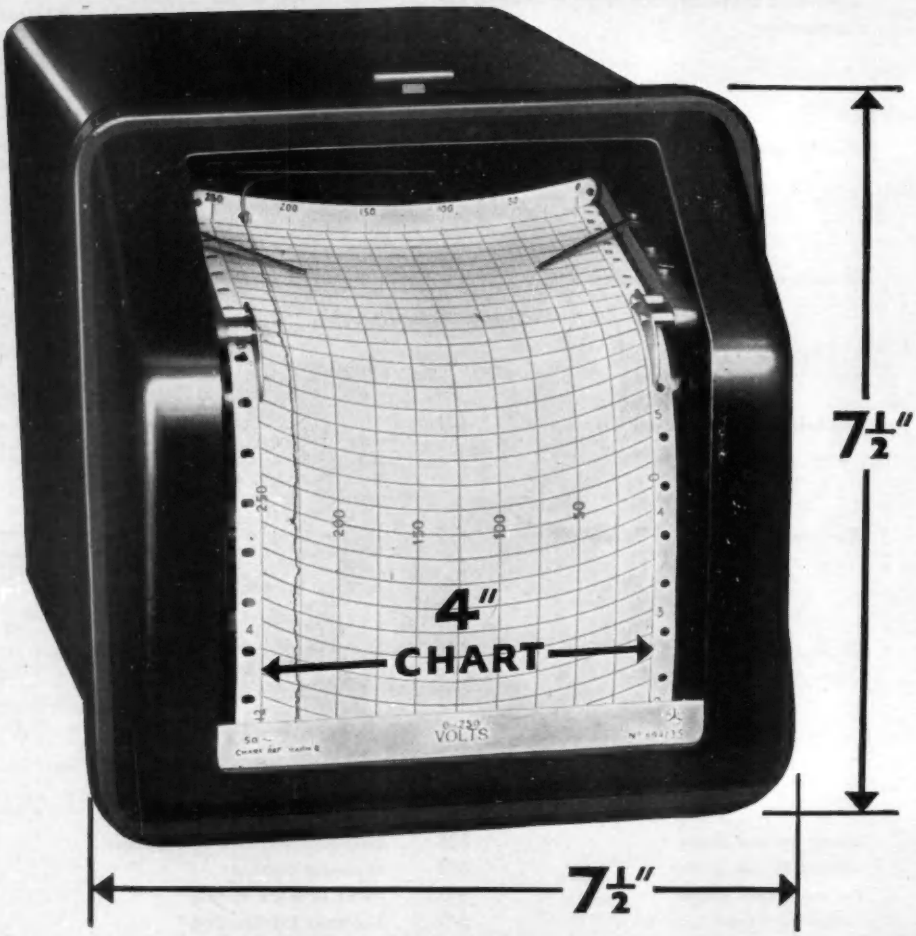

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ELECTRICAL REVIEW

4 April 1958 Vol. 162 No. 14 Established 1872

Modern Scientific Instruments

THE electrical industry has always been closely connected with the world of pure science; historically, perhaps, only the chemical industry has enjoyed a similar relationship and both are new industries, not more than a century or so old. In the 19th century such pre-eminent physicists as Maxwell and Rayleigh were prominent in the devising of new techniques and instruments for the growing electrical engineering industry and to-day a similar evolution may be seen at the Physical Society's annual exhibition of scientific instruments and apparatus. The instruments and equipment on display contain, of course, items of interest to a very wide variety of industries, but it is probably true that members of the electrical industry find the greatest number. This applies whether the emphasis be on instruments of direct usefulness to electrical generation or the manufacture of electrical machinery, or on the variety of mainly electronic techniques which can be seen applied to the problems of almost every other industry.

The 42nd exhibition which was held during last week is described in later pages of this issue and it will be seen that both of the approaches above lead to much that is of interest. Many of the fields represented are expanding at a rapid rate; this is especially true of the range of transistors, diodes, memory circuits and solar generators coming under the generic term of "solid state devices," and many of the exhibition handbook entries gave little indication of the striking products which would be exhibited, of which a 10 kV rectifier stack measuring about a foot long by an inch diameter may be instanced. Even in the longer-established fields development is always going on; sometimes in the refinement of conventional instruments, sometimes leading to such instruments as the digital voltmeter in which the knife edge pointer and the anti-parallax mirror are replaced by as many dekatrons or illuminated numeral counting tubes as are needed to give the number of significant figures required, while the instrument counts up the voltage to be measured by digital techniques. And, of course, the nuclear industry demands a degree of instrumentation undreamed of a decade or two ago. Exhibits illustrating all these were on show in the Horticultural Hall last week and for those who were unable to attend this year it is not perhaps too soon to make a note not to miss next year's exhibition.

B.E.A.M.A.'S INFLUENCE

The annual general meeting of the B.E.A.M.A., like that of most successful companies, is largely a routine affair, but it does provide the chairman with a valuable opportunity for expressing his personal views on the events of the past year and on the industry's prospects. As was to be expected Mr. J. O. Knowles had much that was pertinent to say, in his address last week, on such problems as the effect of restrictions at home on the electrical industry's competitive position in overseas markets, the European Economic Community, the national approvals scheme and international standards.

We were also glad to note, however, that he drew attention to the value of the work of the Association's many committees over and above the immediate results that are dealt with in the Council's annual report. For example, much good derives from the opportunities that these committees provide for representatives from member firms to discuss common problems. And Mr. Knowles rightly paid a tribute to the breadth of view that inspires them to seek solutions acceptable to all without "disguising their personal opinions or trying to snatch an unfair advantage."

It is also clear from Mr. Knowles's remarks and from the annual report that many activities are initiated or taken up by the B.E.A.M.A. which bring benefits to all electrical manufacturers and not only to member-firms. Though all branches of electrical manufacture are not covered by the B.E.A.M.A., it is the largest of the many trade associations and there are occasions when it can, and does, use its authority to speak for the whole manufacturing industry.

DISCRIMINATION

The National Coal Board recently announced that it proposed to encourage the use of small coal, of which there is an abundance, by reducing its price to industrialists and raising the price of large coal. The idea was mainly to diminish, or end, this country's dependence on imported coal. But the Board definitely excluded the electricity supply industry from benefiting by the reduction, an action which appears to be somewhat discriminatory.

Possibly the reason is that power stations are now firm customers and have been adapted to deal with small coal. Thus the Board is under no compulsion to encourage them to use it. In the House of Commons this week Mr. A. M. F. Palmer raised the point in an endeavour to get the Ministry of Power to do something about it. For years the industry has taken this otherwise-unwanted stuff and it (and electricity consumers) should certainly participate in any reduction in its price.

SWITCHGEAR DEVELOPMENTS

One of the main items of equipment on show at the Electrical Engineers' Exhibition at Earls Court last week was switchgear in various forms from light switches to air-blast circuit-breakers. Among the exhibits there was very little that could be described as new. Developments appear to be concentrating on the air-break range and units are now available for 250 MVA at 11 and 6·6 kV. Miniature circuit-breakers are another item of equipment which is developing.

A new departure is a contactorless switch, the principal feature of which is a wound magnetic core with a variable impedance down to nearly infinity. It is to be hoped that this type of device, with the magnetic amplifier motor speed control gear which were both shown at the Exhibition, will not be viewed with distrust by works engineers. In the past, electronic speed control has not had as wide a following as it has merited because of the reluctance of many maintenance engineers to learn a new technique.

COPPER PRICES

Over the last two years the price of copper has dropped from well over £400 per ton to under £170 per ton. The post-war increase in the demand for copper reached its peak in 1956 and coincided with a great increase in production from new plants built to meet this demand. Strikes in 1954 and 1955 in the Rhodesian copper mining areas also helped to increase the copper price.

The main cause of the recent steep decline in the price of the metal has been the drop in the demand for copper, coupled with increased output capacity. Recent announcements of cuts in output have had no effect on the market price. The price of copper is now close to its production cost and although there has been some upward movement in the last week or two it is felt that the price will remain roughly at the present level for some time to come. Any sudden demand for copper would not have such an effect on the cost as that which occurred after the war because of the now greatly increased production capacity. But, Mr. F. R. Haig says in his article on "Overhead Line Economics" which appears on page 638 in this issue, the sharp drop in copper prices does not, however, have such a large effect on the choice between copper and aluminium for overhead lines as one might expect.

WHOLESALERS AND EUROPE

At last week's annual dinner of the Electrical Wholesalers' Federation there were references to the position of wholesalers in any future European Free Trade Area. Mr. Leslie Gamage thought that they could form a valuable link between British electrical manufacturers and the Western European Market and he went so far as to say that the future of many of the manufacturers would depend on them.

The president of the E.W.F., Mr. C. H. Blackburn, spoke of the necessity for proper margins for wholesalers if they were to give full service and said that the Federation was prepared to "fight for what is right." When European Free Trade was established the wholesalers would be offered the products of many nations for distribution but "all other things being equal" they would give preference to British manufacturers; the latter would be expected to deserve such support. These were strong words. While agreeing that there must be reciprocity in any Free Trade arrangements, we would expect British wholesalers to give rather less qualified recognition to British manufacturers.

Scientific Instruments and Apparatus

SURVEY OF THE PHYSICAL SOCIETY EXHIBITION

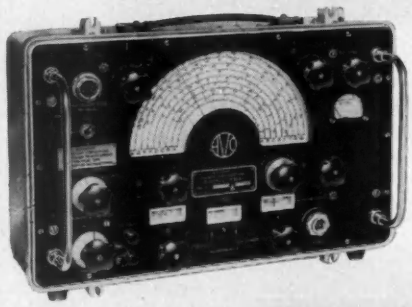
By P. L. DEGEN

THE exhibition of scientific instruments and apparatus which is organised each year by the Physical Society was held in the old and new halls of the Royal Horticultural Society, London, last week. The exhibition, the forty-second in the series, was formally opened on Monday by Professor M. F. Mott, M.A., D.Sc., F.R.S., president of the Society, and it ran until Thursday, 27th March.

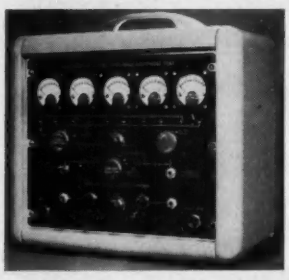
The usual custom was followed of holding discourses in the evenings during the period of the exhibition. On Monday Mr. M. H. Wilson spoke on Goethe's colour experiments and on Tuesday Dr. E. T. Hall spoke on some uses of physics in archæology, whilst on Wednesday evening Mr. R. J. Murgatroyd discussed some recent investigations with aircraft on the physics of clouds and rain. In addition, presentations were made on Tuesday and Thursday of a film on the junction transistor in radio receivers.

In the exhibition itself, the display of transistors was widespread. One striking exhibit was a radar display synchronising pulse generator less than one-twentieth the size of the equivalent conventional unit, and with a total power consumption less than that of a single valve heater.

Low consumption is also a feature of a time and frequency measuring equipment which uses 110 transistors and can measure frequencies from 10 c/s to 50 kc/s, the period of any waveform from 0·0001 c/s to 10 kc/s, and time from 100 μsec to 11½ days. The presentation is digital on five meters calibrated from 0 to 9. The equipment is portable and the loading is only 2 W. Another portable low-consumption instrument is a millisec stop-clock which can measure time from 100 μsec to 27·8 hr. The number of cycles from a 10 kc/s transistor crystal oscillator is counted, the display being on four meters calibrated from 0 to 9 as before, together with a five-figure electromechanical register.



Signal generator



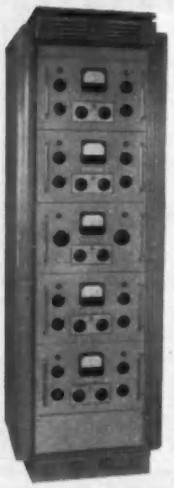
Portable time and frequency measuring equipment

On another stand was a microsec chronometer based on transistors and printed circuits. The range covered is from 1 μsec to 1 sec in 1 μsec steps, and the accuracy is ±1 digit ±0·002 per cent. Any external frequency standard between 30 c/s and 1·2 Mc/s can be used, and frequencies of 10, 10^2, 10^3, 10^4, 10^5 and 10^6 c/s are available at terminals on the front panel. Another instrument by the same manufacturer measures time per unit event or events per unit time; the time range is from 3 μsec to 1 sec in 1 μsec steps with the same accuracy as before, and the events/unit time range is from 30 c/s to 1 Mc/s with an input amplitude of 200 mV. The printed circuits making up these two instruments are also available as separate items. Transistors and printed circuits are also used in a personal radiation monitor which gives audible warning if the radiation level exceeds a pre-set level. Power supplies designed around transistors included a series of d.c. to d.c. convertors working from an unregulated battery source (18 V-28 V) and giving regulated l.t., h.t. and e.h.t. supplies, and another unit operating from a 12 V or 24 V battery and providing up to 80 W. A source of up to 1 A in the range from 0 to 30 V with an output impedance less than 0·05 Ω at d.c. and a ripple of less than 1 mV utilises transistors throughout, except for two gas-filled reference tubes.

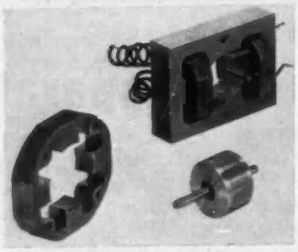
Pulse Generators

A pulse generator for testing and demonstrating oscilloscopes and other similar instruments weighs approximately 8 oz: square and sawtooth waveforms are provided simultaneously at two miniature coaxial sockets at amplitudes of 2·5 V, 5 V or 7·5 V, and repetition rates of 100 c/s, 1 kc/s or 50 kc/s can be selected. Power supplies are derived from three miniature mercury dry cells.

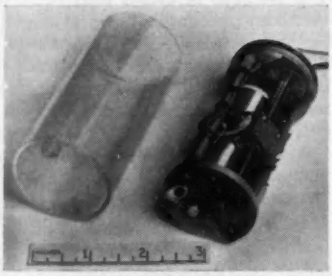
Among pulse generators of more conventional design may be mentioned a fully comprehensive pulse generator for the overall servicing of radar and allied equipment. The frequency range for sine or square waves or pulses is from 50 c/s to 50 kc/s; pulse widths are obtainable from 0·1 μsec to 20 μsec and attenuation is available on all outputs. A delayed pulse and sweep generator has three alternative outputs, each of which is preceded by a prepulse of fixed amplitude and width: a main pulse, a sawtooth waveform, or a cable formed pulse derived from the main pulse. The period is continuously variable from 0·9 μsec to 1·05 sec in six overlapping decade ranges; the delay is variable from 0·09 μsec to 0·105 sec and single-shot working can be obtained. Another pulse generator has twelve discrete frequencies from 25 c/s to 100 kc/s with pulse duration continuously variable from



Magnetic amplifier



Rotor and stator cores of laminated-flake material



Right: Multi-turn slide wire resistor

0·3 μsec to 60 microsec and also features a pre-pulse. Continuously variable and calibrated amplitude and frequency are available in yet another instrument: either single pulses delayed from 0·2 μsec to 2 sec after a pre-pulse, or two identical pulses with the same delay between them are available, and amplitudes of up to 50 V can be obtained at frequencies from 0·1 c/s to 1 Mc/s.

A swept range oscillator incorporates an internal motorised drive enabling the oscillator to be swept either over the whole range available on the main frequency control dial or any desired portion of it. There are five decade ranges, ranging from 1 c/s to 100 kc/s, the total harmonic distortion is less than 1 per cent over the entire frequency range and coarse and fine attenuation are available. Another wide range a.f. oscillator covers from 10 c/s to 100 kc/s in four decades. In each range are ten switch-selected fixed frequencies and a continuously-variable control with an approximately logarithmic scale for interpolation between them. Above 300 c/s the total harmonic content is less than 0·2 per cent, and there is an output attenuator. Other oscillators cover the range from 5 c/s to 500 kc/s and a low-distortion oscillator covers the range from 0·1 c/s to 10 kc/s. A feature claimed for the latter instrument is excellent thermal stability due to a radical departure from conventional mechanical design.

A range of signal generators covers the band from 2 to 12 kMc/s, a typical one covering the frequency range 7 to 12 kMc/s with facilities for internal square and pulse modulation at 3 kc/s, together with a synchronising signal output and provision for frequency modulation. An a.m. signal generator covers frequencies from 2 to 220 Mc/s in six overlapping bands. Internal sinusoidal modulation is provided at 1 kc/s with a f.m. content of only one part in 10^5. A printed circuit attenuator is virtually non-reactive above 200 Mc/s.

The percentage modulation of a.m. signals and the peak deviation of f.m. signals in the carrier frequency range from 2·25 Mc/s to 300 Mc/s is measured by a modulation meter, which will also cover the range up to 600 Mc/s with reduced sensitivity. Modulation depths up to 100 per cent and frequency deviations up to 100 kc/s may be measured in the modulation frequency range from 30 c/s to 15 kc/s.

Amplifiers which were exhibited included a high sensitivity frequency selective amplifier intended primarily for use with thermopiles and photocells, but readily adaptable to other requirements. The maximum gain is 10^8 with a noise level equivalent input of 0·04 μV maximum, and a frequency range of 5 c/s to 2 kc/s with bandwidth of 7 per cent carrier frequency. A d.c. amplifier designed to measure ionisation chamber currents has various other applications. Seven input ranges measure from 10^{-6} A to 10^{-12} A, and a 100 mV output is provided for recorder operation. In another d.c. amplifier drift correction is made by motor-driven contacts with a switching frequency of five per sec. Elsewhere a d.c. amplifier was shown having a precisely known gain and a sufficiently good transient response to give full accuracy in the minimum time, in such applications as the analogue computer field. This is another instrument in which transistors are used throughout, both to minimise space and power consumption and also to obtain maximum reliability. The gain is pre-set in steps of 1, 20, 30, 50, 70, 100, 200, 300, 700 and 1,000, the overall accuracy being better than 1 per cent.

Magnetic amplifiers suitable for industrial use are supplied built into withdrawable chassis and mounted in floor-mounted cubicles. The range of output is from 0·125 W single-phase to 3 kW three-phase at 50 c/s and from 1 W single-phase to 24 W three-phase at 400 c/s. From three to six input windings are provided on all these amplifiers, each input winding being at least sufficient to accept the input required to swing the amplifier from minimum to maximum output. These amplifiers make use of a range of transductors the coils of which are embedded in epoxy resin and insulated to withstand 2 kV r.m.s. The smaller transductors use special laminations to minimise air gap effects, and are assembled after the impregnation process to avoid damaging the strain-sensitive material, while the larger transductors employ a spiral gapless core.

New Materials

Among new materials and components were films of metal and oxide deposits on glass either in a meander pattern or in a continuous high-resistance film. A precision multi-turn slide wire resistor is linear with 0·1 per cent of indicated value throughout 180 turns of the spindle. The resistance range is from 200 Ω to 2,000 Ω, and the application envisaged is in analogue computers. An instrument switch is of completely new design based on research into problems of contact resistance. The overall switch resistance is 0·7 mΩ and the variation of contact resistance 20 μΩ. The switch is totally enclosed and requires no maintenance: so far, 17×10^6 operations have been performed in a life test without deterioration.

A flexible waveguide consisting of die-formed beryllium copper moulded in a pliable synthetic rubber jacket eliminates critical installation problems caused by dimensional variations or vibration. The flexibility is maintained from −55 deg C to 125 deg C. A range of silver-zinc batteries completely sealed in resin and designed for use with transistorised equipment was shown for the first time. A new type of ceramic dielectric is particularly intended for use in transistor and other low-voltage circuits. It has a barrier layer structure, with permittivity above 100,000 and a loss tangent not exceeding 0·05.

Ferrite materials suitable for medium power ultrasonic generation have been developed having a frequency

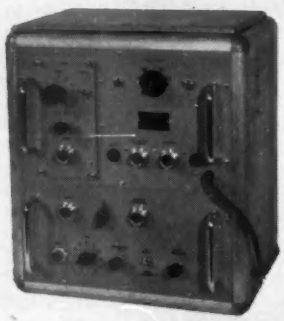
constant variation of 10^{-5} per deg C, and a range of ferro-electric materials was exhibited which are claimed to be superior to barium titanate in memory circuit application. Permanent magnet alloys containing about one part cobalt to three parts platinum are of interest. BH_{max} values of 9×10^6 and a coercive force of 4,000 oersteds are available, and unlike base metal magnetic alloys these materials are extremely ductile before heat treatment and lend themselves to a variety of manufacturing processes for small components where the material cost is not the first consideration. Another interesting magnetic material is that in which small ferromagnetic particles are reclaimed after flattening as an integrally laminated material. It is now being used successfully to replace stamped laminations in small electric motors.

Temperature Recording

The electrical recording of temperature is usually carried out by means of thermocouples, and new materials for this purpose included graphite and silicon carbide in the form of a coaxial assembly which can be used to measure temperatures up to 1,900 deg C without the need of a protective sheath, e.m.f.s of the order 250 to 500 mV being obtained. Improved platinum thermocouple alloys have increased strength and ductility and are prepared by a powder metallurgical process, while in the lower temperature range up to 500 deg C palladium gold : iridium platinum couples combine the oxidation resistance of noble metals with relatively high thermal e.m.f.s. A higher accuracy in temperature measurement is possible by the use of the platinum resistance thermometer, and an element was shown comprising four unsupported helices of 0·001in platinum wire housed in a former of 3 mm diameter and 10 mm long, and thus comparable in size to a thermocouple head for many applications.

Semi-conductor devices in great variety were to be seen on numerous stands. One of the most topical, in view of recent satellite launchings, was a solar generator. A p-n junction is formed within 0·0005in of the surface of a slice of low-resistivity silicon. Under the influence of light, minority carriers diffuse to the junction and so generate a current. The e.m.f. is approximately 0·5 V and the efficiency 5 to 10 per cent. Indium antimonide and arsenide have exceptionally high mobilities, and on several stands devices based on the Hall effect in these materials were displayed. In one case a very compact magnetometer utilising the Hall effect in indium antimonide was cooled with ice to minimise temperature drifts.

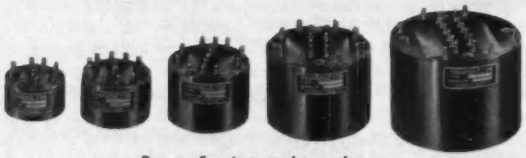
Transistors of both germanium and silicon were on view. The use of silicon confers the ability to operate at ambient temperatures up to 150 deg C, as well as a lower inverse current, and one exhibit showed a d.c. convertor operating at 100 deg C, the output being 250 V, 14 W with an overall efficiency of 75 per cent for an input at 24 V. A medium power range of silicon transistors has a collector dissipation of 4 W at 25 deg C, and a limited spread in current gain is claimed, which facilitates circuit design. Peak inverse voltage ratings of from 20 V to 100 V and a current rating of 250 A are available in a range of water-cooled germanium diodes. Smaller air-cooled rectifiers are also available in this range. Another range of germanium transistors included power transistors up to a rating of 20 W in a Class B stage.



Drift-corrected d.c. amplifier

A number of velocity-modulated tubes were on show at various stands. One range of exhibits included a tunable two-cavity amplifier klystron for operation at 3 cm, with a gain of 10 to 15 dB, and a four-cavity amplifier klystron for the same wavelength, the gain/bandwidth characteristics of which can be varied from 60 dB at 0·05 per cent bandwidth to 40 dB at 0·2 per cent bandwidth. The output windows of both these tubes are of sapphire. A high power klystron with water-cooled collector and drift sections for c.w. operation in the u.h.f. range from 1,400 to 1,600 Mc/s gives an output of 10 kW at 30 per cent efficiency, and another klystron has an output of 15 kW at 34 per cent efficiency, and tunes over the range 470 to 530 Mc/s. It is suitable for a.m. television, f.m. communication systems and certain r.f. heating applications. In the J-band reflex klystrons were shown covering from 12 to 14·5 kMc/s and from 14·5 to 17 kMc/s.

A magnetron which was exhibited weighs only $4\frac{1}{2}$ lb; peak inputs of up to 240 kW may be employed with a duty cycle of 0·001, and it can be supplied for fixed frequency operation in the range from 14 to 16·5 kMc/s.



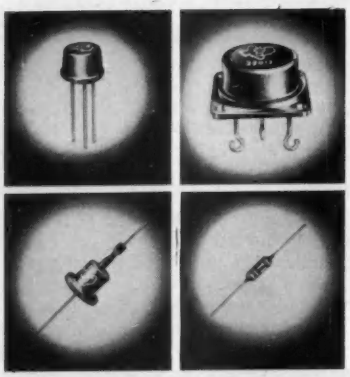
Range of resin potted transductors

A problem which arises in the operation of magnetrons is that of arcing or mode changing, either of which leads to the production of r.f. pulses which are deficient in energy. An instrument covering the S- and X-bands was exhibited which counts such pulses as missing if the energy is below a threshold which may be set between 50 per cent and 90 per cent for pulse repetition frequencies up to 10,000 per sec and pulse lengths from 0·1 to 10 μsec. The "normal" energy level is derived from the pulses immediately preceding the "missing" pulse. The "missing" pulses are counted on dekatrons, and the number of batches of M pulses in which more than n are missing is also counted.

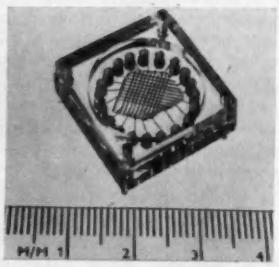
Photomultipliers

A range of photomultipliers for scintillation counting includes a focused type giving an output current in excess of 100 mA, also box and venetian blind structure types. Another range of photomultipliers includes an eleven-stage tube with a 12in diameter window. A fast read-out tube displays numerals from 0 to 9 and a decimal point. It comprises eleven electrodes mounted one behind the other, each having a base connection. On applying the striking voltage between one of these and the common anode, the electrode glows with a neon type discharge and the numeral thus lit is seen through the face of the tube. A less sophisticated device shown elsewhere for the same purpose comprises a stack of ten "Perspex" plates, each engraved with a number, and a bank of ten 6 V filament lamps, each of which is in a position to provide edge illumination to one numeral. In both cases the display is achieved without any moving parts being involved.

Two ranges of cathode-ray flash tubes are now in production, both of which are suitable for producing single



Range of silicon diodes and transistors



Solar generator for the direct conversion of sunlight into electrical energy

Universal measuring bridge

flashes or a succession of flashes of high luminous intensity. Sizes available are 3½in diameter and 23 mm diameter by 75 mm long. One of the tubes in the miniature range can be operated continuously at a luminance of 10^7 foot-lamberts. A 6in diameter tube is under development which dissipates 1 megawatt of power in 0·1 μsec pulses.

One of the Service research establishments showed apparatus for measuring the resolution of cathode-ray tubes. A small sinusoidal waveform of constant amplitude is used to modulate the brightness of the spot as it moves uniformly across the screen, giving a trace whose intensity varies sinusoidally with distance. The amplitude of this intensity variation is measured as a function of the number of cycles of modulation per unit length of trace. The response of cathode-ray tubes to such spatial frequencies from 2 to 200 cycles per centimetre can be measured with an accuracy of a few per cent. Among the many cathode-ray tubes which were shown by numerous exhibitors elsewhere were a high-speed recording tube for single shot and transient recording work with a 5in face and 30 kV post-deflection acceleration applied across a helix; deflection sensitivity is 60 V/cm and maximum writing speed 10^{10} cm/sec. A similar tube combines a sensitivity of only 7 V/cm with a writing speed of 10^9 cm/sec and a spot diameter of 0·5 mm. A tube developed to meet the need for writing speeds up to 10^8 cm/sec retains most of the desirable characteristics of a conventional oscillograph tube. In order to facilitate the utilisation of optical equipment (such as a flying-spot microscope) in conjunction with the tubes the 5in face plates are flat both inside and out.

A new cathode-ray tube for millimicrosec pulse techniques employs a travelling wave deflection system: a pair of balanced 120 Ω transmission lines is arranged for symmetrical deflection of the electron beam, and the input signal is fed in via coaxial connectors. The upper frequency limit is 3 kMc/s and the writing speed 100 trace widths per mμsec at 20 kV. A battery-operated tube is suitable for portable, mains-independent oscilloscopes, and applications where freedom from hum is of paramount importance. The power requirement of the heater has been reduced to 1 W and the internal design is such that the current bleed chain can be eliminated. The high-voltage supply may be obtained from a transistor convertor.

The number of electron guns which can be packed into a single cathode-ray tube envelope has now been increased to eight, all of which have completely separate deflection systems and independent focus and brightness. Two-gun and four-gun tubes are also available. Among the oscilloscopes three approaches to the simultaneous display of several related waveforms may be seen: in some cases multi-gun cathode-ray tubes such as those above are used whilst in other cases arrays of identical single-beam tubes are employed. Typifying the latter approach is an oscilloscope containing four tubes coupled to four identical d.c. coupled Y amplifiers, each of which has a rise time of 100 mμsec and three bandwidths of d.c. to 3 Mc/s, d.c. to 500 kc/s and 30 c/s to 100 kc/s, selected by switching. The input signal range is from 10 mV to 500 V. A beam switching technique is employed to give two displays on a single-beam tube in another oscilloscope. Either 150 kc/s chopping or alternate sweep switching can be employed, and the two vertical deflection channels have bandwidths of 7 Mc/s and a maximum sensitivity of 3 mV/cm. The time base has a range of sweep speeds from 3 cm/μsec to 0·3 cm/sec and will operate synchronised or triggered with trigger delay up to 1 msec. Two traces are displayed on the same tube in another oscilloscope in which both channels cover the range from d.c. to 10 Mc/s, with rise times down to 35 mμsec. The accuracy of the time calibrations on each channel is within 2 per cent, and the oscilloscope can be mounted on a trolley carrying cathode follower probe units and signal delay lines for both channels and a continuous film camera and driving motor. Double-beam tubes are employed in two oscilloscopes one of which has dissimilar amplifiers on the two Y inputs while the other has identical Y amplifiers covering from 5 c/s to 10 Mc/s and two additional pre-amplifiers which may be applied to increase the sensitivity either of the two Y amplifiers or of one of these and the X amplifier.

Accurate Measuring Oscilloscope

A measuring oscilloscope is claimed to be the most accurate in production in the world. It is designed as a measuring instrument rather than purely a display unit. The Y amplifier bandwidth is from d.c. to 15 Mc/s. The time base sweep speeds range from 10 cm/μsec to 10 cm/sec, and in addition time base expansion up to 100 times is provided. Accuracy of both time and amplitude measurement is better than 2 per cent. Another measuring oscilloscope incorporates a distributed Y amplifier and signal delay line: the bandwidth is from d.c. to 50 Mc/s, and the display is on a 5in screen and signal voltages can be measured to 2 per cent accuracy in eight ranges from 0·5 V to 100 V. The X sweep can be delayed from 1 μsec to 0·1 sec in nine ranges, the delayed sweep having a jitter of less than one part in 20,000. A dual-beam unit is amongst accessories available. A distributed amplifier is employed in another oscilloscope of advanced design which has a bandwidth from d.c. to 30 Mc/s and also incorporates a new design of time base. Some novel circuits are incorporated in the time base of another

oscilloscope; sweep times down to 15 μsec are available, and the accuracy of time measurement is 3 per cent from 0·1 μsec upwards. The bandwidth of the instrument is from d.c. to 25 Mc/s, and the rise time is 0·14 μsec.

On another stand two electromagnetic oscillographs were to be seen: the larger of these records up to 12 channels of up to 500 V d.c. on paper or film of 250 mm width. The recorder is operated from the a.c. mains, and the timing marks at 40, 200, 1,000 and 5,000 msec are made by a discharge tube controlled by a quartz crystal oscillator and count-down circuits. The drum camera speed range is from 1 to 400 r.p.m. A variety of measuring bridges was on display: among them was a 50 c/s component bridge having an effective ratio of $10^{12}:1$ and a three-terminal facility permitting the measurement of complex impedances *in situ*. Capacitance bridges included a 1 Mc/s bridge measuring to ±1 per cent in the range 0 to 1,000 pF, a ceramic capacitance bridge with a range of from 100 pF to 0·1 μF with the same accuracy, and a redesigned electrolytic condenser bridge which now provides polarising voltages up to 800 V and will measure leakage currents as low as 1 μA, thus enabling measurements to be carried out on tantalum electrolytic condensers. A megohmmeter of bridge form measures in the range from 10^7 to 10^{14} Ω in seven ranges, with an accuracy of 1 per cent in the lower five ranges and 2 per cent in the upper two. A radio frequency admittance bridge has a frequency range from 15 kc/s to 15 Mc/s. It measures conductances from 0 to 100 millimhos and susceptances from 0 to 25,000 pF to an accuracy of 2 per cent, and is particularly suitable for measurement of the transfer impedance of transistors. A twin-T bridge was designed for the accurate measurement of capacitance in the frequency range from 500 kc/s to 20 Mc/s. It was developed for the purpose of studying the dielectric properties of macromolecules. The capacitance range is from 1,000 pF at the lower frequencies to 200 pF at 20 Mc/s, capacitance changes of the order of 0·1 pF being detectable. A universal measuring bridge incorporates two calibrated ranges. The value of the unknown is indicated on a wide scale together with a suitable multiplier. External standards can be used in conjunction with the bridge circuit and comparisons can be made from 100 to 0·01 times the external standard; 54 insulation ranges give indications of resistance up to 45×10^9 Ω.

Among other instruments of interest may be mentioned a moving coil meter, the pointer of which also carries a "flag." At positions corresponding to zero and f.s.d. are phototransistors, illuminated by means of "Perspex" rods leading from an external light source: this illumination is thus cut off by the flag at either extremity of the scale. Two digital voltmeters were on show: one gives a reading to three significant figures, displayed on dekatron tubes, while the other has three ranges, in each of which the voltage is measured to four significant figures. In either case the information can also be supplied in a form suitable for feeding other machines.

Metals and alloys in liquid form are required to be circulated in certain designs of reactor cooling circuits. Two sizes of electromagnetic pump were exhibited, by means of which such metals, or other conducting liquids, can be pumped without the need of any moving part, or any glands or seals. A very wide variety of other reactor ancillary equipment included a reactor analyser, a reactor controller and a reactor simulator and, of course, numerous designs of radiation monitoring equipment.

An electronic dividing attachment can be applied to the automatic undercutting of the insulating segments of motor commutators. The image of a vibrating aperture is projected on to the surface of the commutator, one of the insulating slots being centred in the image. Displacement from the central position will produce modulation of the reflected beam signal, which is applied via an amplifier to a null setting servo which drives the commutator to a position in which the slot is accurately centred. When this has been done, a cutting wheel makes the undercut, and the armature is then repositioned for the next operation. The whole operation is automatic, and an armature with 28 slots can be undercut in 35 sec, while the accuracy of positioned setting is 15 min of arc, or 0·005in.

Supply Frequency Alarm

An instrument which has now given a considerable amount of satisfactory service in the electricity generation industry is a supply frequency alarm. It has good long-term stability, and the setting accuracy is to better than ±0·1 c/s in the range 47 to 49 c/s. The setting dial is calibrated from 47 to 50·5 c/s and retains its accuracy during supply voltage changes between 120 and 250 V r.m.s., and the relay differential is about 0·15 c/s. Indication of frequency is given by another range of meters. These can be obtained up to 33in square and miniature recorders can also be supplied. Two circuits are supplied from the alternating current to be measured, and the currents in these respond differently from changes in frequency. Rectification produces proportional direct currents, the difference of which provides an indication of the departure of the frequency from nominal.

Instruments for use in coal mines are required to be intrinsically safe, i.e. any sparking which may occur must be of inadequate energy to cause the ignition of explosive mine atmospheres. One such instrument which was exhibited is a listening equipment for detecting hammer-blow or other noise signals which may be made by trapped miners. Sounds transmitted through the strata are picked up by an electromagnetic geophone, amplified, and presented both aurally and visually. The amplifier utilises low dissipation sub-miniature tubes, low operating voltages, limiting resistors and other devices to ensure intrinsic safety; printed circuits are used, and the components are potted in resin.

The most refined method available for the detection of leaks in vacuum vessels and pressurised containers is the mass spectrometer with helium tracer gas, and this year three of these instruments were exhibited. One of them dispenses with a heavy magnet by generating ions in the neighbourhood of a heated filament and passing them

X band klystron 1 kW c.w. amplifier

3¼in diameter and miniature cathode ray flash tubes

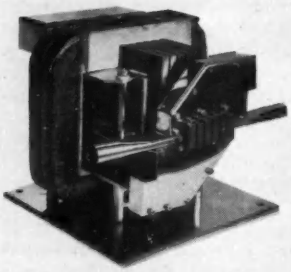
through five grids which are connected alternately to a r.f. source. The frequency is such that a helium ion traverses each of the four gaps during half a cycle. The final grid carries a repelling bias which allows only the accelerated helium ions to reach the collector. This instrument will detect leakage rates as low as 10^{-6} lusec (litres per sec at 10^{-3} mm Hg) into vacuum. The other two instruments have similar sensitivities, and in addition one of them will detect leaks from a pressurised system by sampling the atmosphere around it and can also be adapted to the continuous monitoring of the composition of a process stream.

Extremely accurate measurement of small displacements or length differences, such as that between a test specimen and a pile of slip gauges, is obtained in an instrument consisting of a highly flat worktable and a bracket which runs on a massive column and carries a differential inductance transducer probe. Differences down to a few micro-inches can be read from a meter, and the output from the amplifier is also available to drive a pen recorder. Similar applications are possible for a high-sensitivity diode transducer system. A diode bridge circuit is fed with a r.f. voltage, the diode circuit being housed in a compact probe across the terminals of which a variable capacitative element is connected. The basic sensitivity is such that a change of 1 pF results in a probe output of 2 V, and the dynamic response is constant from d.c. to several thousand kilocycles. Among other transducers were angular accelerometers and a linear accelerometer with a working temperature range from 40 deg C to 100 deg C life tested to 12 million operations, and piezo-electric elements employing barium titanate and lead zinconate.

Piezo-electric crystals employed in ultrasonic flow detection probes have been improved by making them into sandwiches and switching the interconnecting foils. A frequency range of 7 : 1 can be covered and the probes can radiate through water or oil. Several production ultrasonic flow detectors were on show: detailed improvements had been made in some designs, and the ranges of probes available has been increased. Detection of a different nature is the province of an electronic intruder alarm. The intricate wiring and multiple alarms of the conventional burglar alarm are dispensed with in this equipment in which printed circuit techniques are used throughout. An electrostatic speaker radiates at an ultrasonic frequency which produces a wave pattern in the guarded area, any movement in which causes modulation of the emitting frequency which is detected by a microphone, amplified and finally operates a relay to energise the alarm system.

Photographic Print Preparation

Finally, there were no fewer than four equipments on show for the improved preparation of photographic prints. Two of these are designed for black and white prints: both of them are intended for contact printing from large negatives, up to 14in by 17in, and in both cases the negative is scanned by a flying-spot cathode-ray tube, and the amount of light passing through the negative paper combination is monitored by a photomultiplier, the output of which is amplified and fed back so as to compensate for variations in the mean density of the negative. The effect on negative detail can be controlled by varying the size of spot. One of the main applications of these is to aerial photography. The third equipment determines the correct exposure time when printing enlargements by metering a very small area (1 mm^2) of the projected image. When changing the grade of paper, a calibrated knob is turned, while very short exposures can be handled by the automatic controller at high speed. The fourth of these devices holds out the prospect of improved colour prints. At present exposures are determined by integrating the colour of the negative or transparency and assuming that most subjects will give a neutral grey. This leads to gross colour distortion, and the only alternative is the laborious and expensive one of trial and error. In the experimental equipment which was on show last week a closed circuit colour television system has controls which correspond to the variables in the printing process. By operating these until the desired result is obtained on the visual display, the correct printing conditions are found directly.



6 g.p.m., 15 p.s.i. single-phase a.c. conduction pump for liquid metals

Mass spectrometer for detection of leaks in vacuum or pressurised systems

Professional Engineers' Appointments

THE Professional Engineers' Appointments Bureau, in its report for 1957, states that a steady demand for engineers of all grades was maintained during the year although some reduction in the number of vacancies notified became apparent during the latter months.

Civil engineering has offered some interesting and well-paid posts abroad, whereas mechanical and electrical vacancies have tended to be for design, development and research engineers, based in the United Kingdom. The more senior vacancies were mainly managerial or administrative. Salary and location requirements insisted upon by individuals continued to be the major factors governing the selection and ultimate results achieved.

In connection with the advisory service which the Bureau offers engineers and employers, the report cites the case of one engineer who was placed quite quickly after he had been shown a better method of presenting particulars of his experience to the employer at an interview. In another case the Bureau was able to advise an employer wanting to fill a particularly difficult vacancy of the existence of an engineer whose experience was exactly what was required. This engineer was not actively looking for a change but had made it known that his present post was not entirely satisfactory, and that he might be considering a change at some future date.

There appeared to be virtually no change in the attitude of employers to consider older men. Any external influence, initiated by organisations interested in this difficult problem, seemed to make no difference whatsoever in improving the opportunities for these men.

The Bureau draws attention to its recent change of address. The offices are now at 39, Victoria Street, S.W.1 (Abbey 1737).

THE OBJECTIVE FOR EURATOM

I.E.E. Lecture by Professor F. Giordani

THE Italian Ambassador, Count Vittorio Zoppi, was present by invitation at the meeting of the Supply Section of the Institution of Electrical Engineers on 26th March, when Professor F. Giordani delivered a lecture on "The Objective for Euratom."

Describing the economic background, Professor Giordani said that coal was still widely available in the United States and in some areas mining conditions were still so good that their costs could stand any competition. The average level of electricity prices in the United States was therefore kept within reasonable limits and this constituted one of the most important factors in American industrial development.

In Western Europe the growth of available resources did not keep pace with consumption, so that there was an anxious search for new and abundant power sources. "All our hopes are now pinned on nuclear energy," continued Professor Giordani. As happened with every new technical achievement, costs would decrease in time and would become competitive with those of conventional power. For the time being they could rely on fission processes and on the existing uranium and thorium reserves, but they had reasonable hopes of succeeding in the utilisation of nuclear fusion, which could make available the practically inexhaustible reserves of heavy hydrogen.

Study of Nuclear Prospects

In November, 1956, a committee of three experts was entrusted with the task of submitting a report on the amount of nuclear energy which might be produced with the least possible delay in the six member countries of the European Coal and Steel Community and of indicating the facilities to be installed for this purpose. These experts submitted their report in May, 1957, shortly after the conclusion of the treaty for Euratom. The study undertaken by them was founded on the law of the increase in power demand as a function of time. Equating to 100 the total requirements of the six countries in 1955, an index of 183 for 1975 was obtained. This involved an average annual rate of increase equal to 3·1 per cent, which seemed more than justified as compared to the value deduced from the historical trend of world consumption of around 4 per cent.

The experts of Euratom had been worrying about the tremendous financial charge which importations of power involved, these imports being estimated as going up to 282 million tons of equivalent coal in 1975. It was urgently necessary to fix a target that could bring the maximum improvement through a programme to be started as soon as possible in the six countries. The possibility of a rapid start on a nuclear energy programme was supported by the favourable results of English experience after the successful operation of the Calder Hall plants. The target of releasing through nuclear plants 40 million tons of equivalent coal as conventional fuels eight years earlier than 1975, through the efforts of the Euratom countries alone, was an ambitious one, but it was justified when it was recalled that the programme outlined in the United Kingdom White Paper had been increased threefold, from 2 to 6 million installed kW. The Euratom target for 1967 was two-and-a-half times as much as the British one, while the ratio of population was 3 to 1 and that of electricity output was 2·8 to 1.

Exchanges of views with the Canadian, British and American authorities proved that the availability of nuclear fuels was not to be considered a limiting factor in this project. The establishment of the International Atomic Energy Agency (I.A.E.A.) under the United Nations, as well as the arrangements under way in favour of Euratom, was evidence of an excellent spirit of co-operation.

As to the possibility of realising the plants needed, both American and British manufacturers gave assurances, but the Euratom Committee never lost sight of the necessity of avoiding an excessive burden on the balance of payments. The benefits of the replacement of traditional by nuclear fuels would be lost if the European countries had to purchase abroad the plants required.

Manufacturing Capacity

British manufacturers had stated that within the next ten years they would be in a position to supply the 6 million kW for the expanded national programme, and they might furthermore export all the machinery required for an equal amount of power. This meant a total productive capacity of about 12 million kW in ten years. According to an investigation which the O.E.E.C. carried out in the countries of Western Europe, the mechanical and electrotechnical industries of the six Euratom countries had a total capacity exceeding by 60 per cent that of the corresponding British industries. Therefore the national industries could supply within ten years the equipment needed for nuclear power stations producing a total of 15 million kW.

Professor Giordani announced that in Italy an agreement had been reached between the International Bank for Reconstruction and Development and the Italian Government with a view to collecting the tenders of manufacturers and evaluating them critically, in order to reach the most reasonable decisions on the choice to be made. The U.K.A.E.A., the U.S.A.E.C. and Atomic Energy of Canada, Ltd., offered their widest assistance in this study.

Radio Communication for Aircraft

IN an informal talk before the Radio and Telecommunication Section of the Institution of Electrical Engineers on 31st March, Mr. W. E. Brunt discussed future radio communication methods for the control of civil aircraft. At present, he said, most aeromobile communication was done by radio-telephony and the use of telegraphy was rapidly diminishing. With increase in aircraft speeds and other modern developments, however, telephony would probably need to be supplemented by automatic computers. Congestion on aeromobile channels was due not to the amount of information passed but to the inefficiency of the means employed. A composite system would be desirable in the future in which all routine (i.e. predictable) messages would be handled by automatic signalling of optimum speed and bandwidth and requiring the minimum of human intervention, leaving telephony to deal with only non-routine or unpredictable matter.

Overhead Line Economics

Choice of Conductors and Effect of Copper Price Fluctuations

By F. R. HAIGH, B.Sc., A.M.I.E.E.*

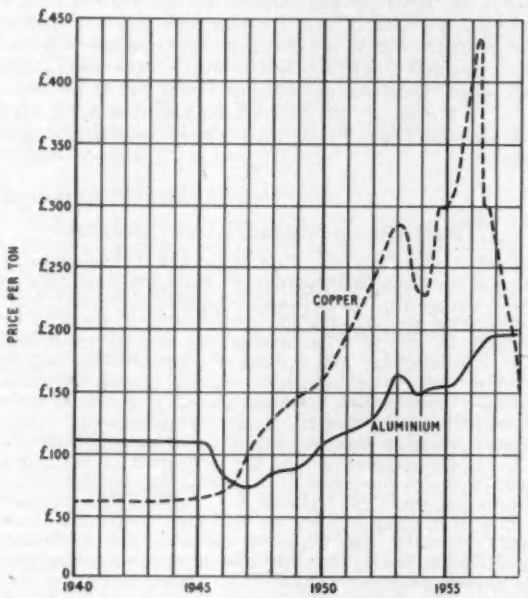
THE recent wide fluctuations in the market price of copper have been caused by unforeseen variations in the supply and demand. The reasons for this include factors such as increased use of the metal, strikes in the Rhodesian copper mining areas, stockpiling, etc. The extent of the variations in the price of electrolytic copper wire bars since 1940 is shown in Fig. 1.

Hard-drawn high-conductivity copper is technically the most suitable and most widely used conductor on all overhead lines on which high tensile strength is not required. This means that copper conductor predominates on wood-pole lines but, in the case of steel-tower lines, the longer spans employed and the necessity for keeping the conductor sag and consequently the tower heights to the minimum requires the use of a higher tensile strength conductor.

For a number of years, the high price of copper caused the balance between the use of copper and other possible metals to be disturbed, with the result that there has been a general tendency to use an alternative metal. Where low initial cost is of chief importance stranded steel conductor may be used, but the various conditions relating to the use of this conductor have not appreciably changed since my article dealing with this subject was published 13 years ago.[1]

There is no doubt that aluminium is the most suitable alternative metal for use as an electrical conductor and it has been used, to some extent, for over 50 years. Following the passing of the 1926 Electricity (Supply) Act, of which Section 8 provided for the establishment of the British grid system, the use of steel-cored aluminium conductors in the construction of the grid caused aluminium to come to the forefront as a conductor material. The combination of high tensile strength and high current-carrying capacity obtained with steel-cored aluminium conductors has caused them to be used, almost without rival, for overhead lines of large capacity and long spans.

Fig. 1.—Variations in copper and aluminium prices



It was not until the price of copper began to rise considerably above that of the more stable-priced aluminium (see Fig. 1) that the use of aluminium on wood-pole lines became widespread. It is a well-known fact that for a line of fixed voltage to transmit a given amount of power at a given efficiency between two points, the weight of aluminium required is approximately half that of copper. This is because the resistivities of the two metals are such that, for a given resistance per unit length, the area of an aluminium conductor is about 50 per cent greater than that of a copper conductor, whilst the specific gravity is only about one-third. Hence, consideration of the basic properties of the two metals indicates that the cost per ton of aluminium must exceed twice that of copper to cause it to be a less economical conductor. This might well be true in practice in the case of short conductors, such as busbars, but certain adverse complications are introduced when aluminium is used for overhead line conductors.

Use of Aluminium

One complication is that it is necessary for linesmen engaged on wood-pole overhead line construction, to acquire the technique and skill required to deal with aluminium conductors. Linesmen used to working on copper conductors have to be made conversant with the different erection and jointing methods used with aluminium, aluminium alloy, and steel-cored aluminium conductors. This includes becoming familiar with such operations as making compression-type joints, using new-type hand and hydraulic tools, fitting bimetallic joints, learning to avoid risk of damage to the softer and more easily corrodible conductor and the technique of cleaning and greasing all electrical connections.

A further complication is that aluminium is liable to deteriorate due to industrial or coastal corrosion, but the present practice is to treat aluminium conductors with suitable greases and, as shown by Forrest and Ward,[2] this treatment has a definitely beneficial effect in prolonging conductor life. It is, therefore, now common practice for steel-cored aluminium, aluminium alloy, and all-aluminium conductors with seven or more wire strandings, to have the inner wires coated with grease during manufacture to guard against corrosion.

Since aluminium conductors have larger overall diameters than the equivalent copper conductors, the wind loading on an ice-coated conductor will be greater with

* Yorkshire Electricity Board.

[1] Haigh, F. R., "Steel Conductor Lines," *Electrical Review*, 6th April, 1945.

[2] Forrest, J. S., and Ward, J. M., "Service Experience of the Effect of Corrosion on Steel-Cored Aluminium Overhead-Line Conductors," I.E.E. *Proceedings*, June, 1954, Vol. 101, Part II, p. 271.

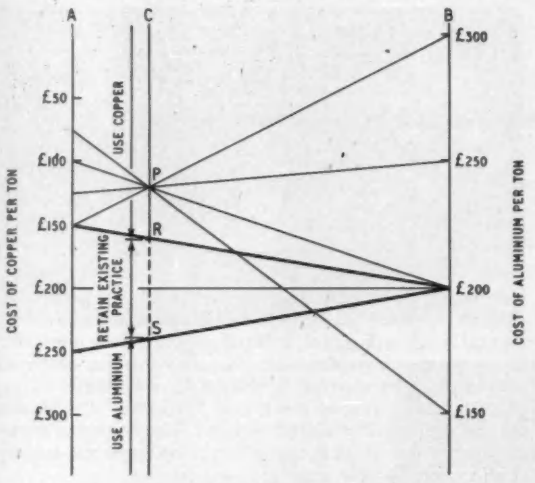


Fig. 2.—Nomogram for ascertaining change-over point

aluminium so, for a given factor of safety on the poles, the pole diameters will be greater.

The high scrap value of copper compared with aluminium is usually regarded as a point in favour of copper conductors but there is, of course, no guarantee that this will be so when conductors now being erected have reached the end of their useful life.

Saving in Capital Cost by Using Aluminium

In spite of the necessity of having to take the precautions just referred to, the high price of copper has more than justified the widespread use of aluminium conductor on all types of overhead lines during the past three or four years and considerable saving in capital cost has resulted. The saving depends upon the type of aluminium conductor used. Thus, in the case of low- and medium-voltage lines, for which hard-drawn all-aluminium conductor is suitable, there is considerable saving in using aluminium. Most of the rural centres of population in this country which require extensive medium-voltage overhead distribution lines have, however, already been supplied, thus limiting the total saving which can be made in this manner.

For the higher voltage lines, the longer spans employed and the necessity of keeping the conductor sags to the minimum normally preclude the use of hard-drawn all-aluminium conductor. It is, therefore, necessary to use either aluminium alloy such as " Silmalec " or steel-cored aluminium, both of which have a considerably greater tensile strength. Both these conductors are more expensive than the equivalent all-aluminium conductor, the alloy being the most expensive of the three, but even at the lower copper prices ruling to-day, they are both cheaper than the equivalent copper conductor. This lower cost is, however, largely offset by the factors previously referred to and it will be apparent that as both aluminium alloy and steel-cored aluminium have a greater diameter than the equivalent all-aluminium conductor, the greater wind loading results in an increased cost of supports.

While to-day's metal prices cause aluminium alloy to have little overall cost advantage over copper, the same is by no means true with steel-cored aluminium. Provided a line is suitably designed and correct construction methods are employed, the use of steel-cored aluminium still results in appreciable saving, particularly in the case of the large size conductors.

B.S. 215: Part 2: 1956 specifies the steel and aluminium wire stranding in steel-cored aluminium conductors and it is unfortunate that the sizes 0·15, 0·175 and 0·2 sq in copper-equivalent appear to be primarily designed for steel-tower lines. The high tensile strengths of these conductors cannot be utilised on wood-pole overhead lines and there is scope for the use of conductors of these equivalent sizes having a greater aluminium-to-steel ratio. It is true that the conductor manufacturers will readily supply steel-cored aluminium conductors with any aluminium-to-steel ratio which may be specified by the purchaser, but there is a natural reluctance to use non-standard conductors, even though it may result in greater economy. Compression-type terminating clamps and joints which are normally used with these conductors, increase the construction costs, but this has recently been offset by the introduction of less costly compression joints fabricated by argon-arc welding of extruded aluminium sections.

Choice of Conductor

It will be seen that the choice of conductor is not governed by any hard and fast rule based on current metal prices and it will be apparent, that there must be, in practice, a considerable lag between metal price alterations and change of conductor. This lag can be illustrated by a simple nomogram of the type shown in Fig. 2. The A and B ordinates are scaled to represent the cost of copper and aluminium respectively. The parallel ordinate C is drawn through point P, at which straight lines joining points on the A ordinate to points which represent twice the cost on the B ordinate, intersect, four of these lines are shown. If metal prices alone were the governing factor in deciding which metal to use, the correct metal could be obtained by drawing a straight line between the point on the A ordinate representing the current cost of copper and the point on the B ordinate representing the current cost of aluminium. If this line intersects the C ordinate above P, the correct metal to use would be copper and if it intersects below P, aluminium should be used. In practice the factors already referred to cause point P to be lower down the C ordinate, and the lag, which has also been referred to, causes P to lose its sharply defined location and become a line on the C ordinate, such as RS. The positions of points R and S and the scales used will be dependent not only on the type of overhead line to which the diagram refers but also on such features as the method of construction, the efficiency of construction, and the ratio between the cost of labour and the cost of material. The diagram illustrated is drawn for an overhead line, for which, with aluminium at £200 per ton, it becomes more economical to use copper when the price is below £150 per ton and more economical to use aluminium when the copper price is above £250 per ton and between these limits existing practice should be retained. A diagram of this type, constructed to represent a given set of conditions, will indicate the conductor selection policy to be adopted with variations in the costs of the two metals.

Conclusion

The points referred to show that the recent spectacular drop in the price of copper does not by any means point to the sudden abandoning of the use of aluminium. In dealing with wide fluctuations of price differential between the two metals, it is necessary to have a predetermined policy and it is suggested that this article may give a lead in enabling this policy to be determined.

VIEWS on the NEWS

By REFLECTOR

IN the House of Commons last week Mr. G. Nabarro again drew attention to the inequity of imposing a 60 per cent purchase tax on gas and electric domestic water and space heaters which was inimical to the aims of employing home-produced fuel efficiently, relieving atmospheric pollution and exporting domestic appliances. Mr. Nabarro announced that his sustained series of Parliamentary questions would reach its "century" this week. One would have thought that this wearing-down process would have some effect upon the Treasury. Indeed it may yet have results, but the Financial Secretary declined to prognosticate about the imminent Budget.

* * *

India's language problem was the subject of a recent article by the Delhi correspondent of *The Times*. It dealt with the clause in the Indian Constitution that Hindi (which has Sanskrit origins) should replace English as the official language within fifteen years. One measure of the magnitude of the task is that 250,000 new Hindi technical terms must be devised in order to effectively replace English, "a process which they optimistically estimate can be completed by 1960."

An article in *Punch* by D. F. Karaka illustrates, somewhat playfully perhaps, the difficulties of translation. It deals with railway signalling and says that while "Stop," with red, and "Go," with green, were easily understood by Indians, it was thought necessary to "Sanskritise" certain essential words. Thus "railway signal" became "Agnirathagamanagamanpathanidharshakbhayasuchakthambradhawallohapattika" compounded of the equivalents of "a vehicle run on fire," "the rhythm of the wheels," "a pathfinder," "an indication of danger," and "copper wire."

* * *

There was a slightly acrid discussion at a meeting of the East Barnet Chamber of Commerce reported by the *Barnet Press*. Complaints were made by shopkeepers of the rates charged by the Eastern Electricity Board and one member suggested:—

> "There is something wrong somewhere. Your pockets should be well lined. It used to be the installations that gave us the shocks, but now it is the Board."

Another member raised the question of co-operation between the Gas and Electricity Boards, but the Eastern Board's representative at the meeting said that "an alliance might result in muddles over therms and units if meters were read together." With a proper "alliance" there might be one meter for both.

* * *

Last week the *Electrical Review* mentioned a call from the miners for restrictions upon oil imports because stocks of coal were accumulating. Ignoring this, the *Esso Magazine* repeats the generally-accepted opinion that we shall need all the coal we can get and that there will be a fuel deficit which will be met mainly by oil—at least until nuclear power is available. But the journal reminds us that oil is not only a fuel; it is still supreme as a lubricant. Even greater prospects for oil exist in the chemical industries; particular mention is made of synthetic fibres, plastics, resins, carbon black and fertilisers. Oil is also the main source of synthetic rubber. The one great drawback to the use of oil is that it has to be imported, largely from rather unstable areas.

* * *

Among the motions upon the agenda for the annual conference, in June, of the National and Local Government Officers' Association, set out in *Public Service*, the Association's journal, I note the following:—

> "That in view of the growing insecurity of tenure of officers in the gas industry, this Conference instructs the National Executive Council to use the full resources of the Association to seek an agreement for the protection of its members in this minority service."

It is true that electricity has made the pace in securing new business, but I cannot believe that conditions in the gas industry are so alarming as this motion suggests.

* * *

Another gas group is apparently not satisfied that the scope of the committee now inquiring into co-operation between the gas and electricity supply industries is wide enough. It proposes the appointment of a Royal Commission on the subject "to provide a Power Policy Plan for the most efficient integration of the services to the nation from coal, gas, electricity, oil and nuclear energy."

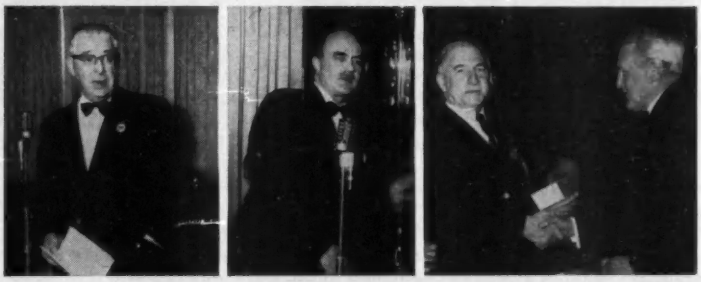
* * *

It was in 1950 that the Irish Electricity Supply Board put its first peat-fired station, at Portarlington, into operation; it now has two such stations running. But Ireland might have had power from peat half a century ago if the aims of the Dublin & Central Ireland Power Co. had been achieved. The *Electrical Review* of 3rd April, 1908, reported the deliberations by a Select Committee of the House of Commons on a Bill promoted by this company. The proposed station was to be at Robertstown, where peat was available, and the company claimed that it would be able "by a process not yet familiar in this country, but which was known in other countries, to generate electricity at a much cheaper rate than could be done by the use of coal." Apparently the company would have relied at first on supplying energy to tramways, but eventually, it maintained, the existence of a cheap power supply would attract industries to the vicinity of the power station. The Dublin Corporation wanted to exclude the company from its area, although other municipalities, it was thought, would consider taking bulk supplies. Anyhow, I see that the scheme came to nothing for the Select Committee found that the preamble of the Bill had not been proved.

Electrical Wholesalers' Dinner

Possible Effects of European Free Trade

The president (Mr. C. H. Blackburn) with Mr. Leslie Gamage and Mr. Ivor Williams



Left to right: Mr. Harry Riley, Sir Harold Bishop, and Mr. Blackburn making a presentation to Mr. A. B. Wildsmith, the former director of the E.W.F.

AT the annual dinner of the Electrical Wholesalers' Federation, held at the Dorchester Hotel, London, W.1, on 27th March, Mr. Leslie Gamage (chairman of the General Electric Co., Ltd.) was the principal guest. Mr. C. H. Blackburn, president of the E.W.F., was in the chair.

Mr. Gamage proposed the toast of the Federation and in referring to current problems said that the slowing-down of business was not a slump; we could, however, talk ourselves into one. After mentioning that the members of the Federation had a turnover of some £60 million a year, he said that there was never a time when such a strong association was more needed.

He said that the passing of the Restrictive Trade Practices Act had been equivalent to the removal of the Queensberry rules. But although the rules had been removed the electrical industry was trying to play the game as though they still existed. The iniquitous purchase tax discouraged labour saving and cleanliness and the E.W.F. had played its part in condemning the absurdity of the tax. If it were replaced by an all-round turnover tax the present discrimination would be avoided.

Link with European Market

While the present credit restrictions might be necessary they were destroying the home market when it was most needed to form a basis for export trade. If the European Free Trade Area came into being (as he believed it would) the wholesalers would be a valuable link and the Western European market would become their "home" market. He hoped that many of them would open their own offices on the Continent. On the wholesalers would depend the future of many manufacturers in this country.

He had the highest regard for the Federation which he thought was indispensable to a united industry. In this connection Mr. Gamage referred to the services of Mr. A. B. Wildsmith, who recently retired from the position of director of the Federation, and wished him many years of well-earned leisure. Mr. Gamage concluded with a reference to the E.W.F. president who, he jocularly said, owed his success to his early training with the G.E.C.

In his response to the toast Mr. Blackburn said that Mr. Gamage had rendered his company, his industry and his country great service in the promotion of export trade; all present had benefited to some extent from the success which had attended his endeavours.

Mr. Gamage had mentioned that the turnover of the Federation's 200 or so members amounted to about £60 million a year, but was it realised that this necessitated the holding of stocks to the value of £15 million? Mr. Blackburn thought that the Government had been compelled by public opinion to introduce the Restrictive Trade Practices Act—and it might have been worse. There had been no reckless price-cutting scramble; a general acceptance of the importance of playing the game was a far better bonding agent than rules, regulations and the fear of fines.

The retailer must have a margin adequate enough to enable him to give proper service and the manufacturer had the right to protect that standard by insisting on the maintenance of his prices. Equally, there was acceptance of the fact that the wholesaler should be paid adequately for his services to the retailer, contractor, large industrial user and manufacturer.

The Federation had been accused of being unduly exclusive, but no wholesaler who measured up to its standard was excluded. When they considered that something like 600 firms received wholesale terms under one or more B.E.A.M.A. section headings it was not surprising that they began to wonder if manufacturers were quite so concerned as they were in the maintenance of high standards.

During the past year the Federation had decided that when their margins were attacked they would fight for what was right. They felt fully capable of justifying the margin which they required, even to the point (in suitable cases) of registering their action under the Restrictive Trade Practices Act.

He, personally, welcomed the idea of a European Free Trade Area as a first step to universal free trade. As Mr. Gamage had said, the existence of a Free Trade Area

would present wholesalers with difficult decisions which might affect the future of many British electrical manufacturers. It would be well for all to recognise the importance of this issue and the way in which manufacturers saw the key position of British wholesalers. Other things being equal, the wholesalers would, or should, give preference to British manufacturers, but it would be for the manufacturers to deserve, rather than command, their support.

Wholesalers would go out and sell in the wider markets offered; many of them already had a valuable export trade. The selling in the European market of the products of British manufacturers, for whom separate selling organisations would not be economic, would inevitably entail buying in the European market and he saw no reason to be afraid of that.

He agreed with Mr. Gamage upon the necessity for a firm and prosperous home market and in his condemnation of the purchase tax. He did not believe that its removal need mean the introduction of a sales tax. Instead, the Government should make drastic economies in expenditure, promote increased output efficiency and make wage claims more difficult to justify by doing away with purchase tax altogether. They should start by making reductions immediately and by publishing a programme of further reductions. Mr. Blackburn referred to the unnecessary clerical work and other costs in which wholesalers were involved in the collection of "untold millions" without a penny reward, and to the many other undesirable effects of purchase tax.

He concluded his remarks by saying that the manufacturers and wholesalers were essential to each other and he hoped that their friendly association would long continue to their common benefit.

Mr. Harry Riley, vice-president of the Federation, proposed the health of the guests in an amusing speech and in the course of his reply Sir Harold Bishop (president, Association of Supervising Electrical Engineers) said that wholesalers did not live in the atmosphere of the classroom but among the actualities of the market place. Mentioning the many interests represented by the guests Sir Harold drew their attention to the Electrical Engineers' Exhibition which was well worth visiting.

In a reference to television, the speaker said that the situation had changed very considerably in the last two years. There were now eight million licences; the increase in the number of sets had been no greater in areas in which commercial television could be received than in districts covered by the B.B.C. alone. He contended that commercial television had been of no assistance to the radio trade, but both parties had benefited from the work of the B.B.C. Commercial competition, he said, had raised the B.B.C.'s programme costs by 80 per cent.

Finally, Sir Harold expressed his best wishes to Mr. Riley who was taking over the presidency of the Federation.

Earlier in the day, at a luncheon following the annual general meeting, a presentation was made to Mr. Wildsmith, the former director, by the president.

Elections

Mr. H. Riley, chairman, John Riley & Son (Electrical), Ltd., has been elected president of the Electrical Wholesalers Federation for 1958-59; he has been a member of the Council since 1939 and was president in 1948. Mr. Riley was also president of the Electrical Industries Benevolent Association for 1956-57. The new vice-president is Mr. F. J. Blackwell of the Electrical Wholesale Supply Co. (Leicester), Ltd.

E.R.A. REPORTS

THE ratio of positive ion current to electron current in an ionisation gauge is proportional to the pressure, so that, by keeping the electron current constant, the pressure may be determined directly from the positive ion current. It is, therefore, desirable to control the filament current of an ionisation gauge to give a constant electron emission. Since changes in pressure often affect the emission of the filament, an automatic regulator is by far the most convenient way of keeping the electron current constant, and it makes the gauge particularly useful for continuously monitoring pressure in a vacuum system.

There are available a number of commercial regulator units, but these are usually rather expensive. A large number of regulators has been described in the literature but that described in E.R.A. Report Ref. G/XT160, "A Simple and Inexpensive Emission Regulator for Ionisation Gauges," by M. P. Reece (price 4s 6d) is exceedingly simple and made from readily obtainable components.

E.R.A. researches on contactors have revealed a number of important variables which must be accurately controlled if consistent results are to be obtained. These are listed in Ref. G/T306, "The Variables that Arise in Contactor Testing," by H. W. Baxter and Z. Cetnarowicz (price 12s 6d), together with some notes on the probable effect of a change in the variable and any relevant conclusions. Where a variable is likely to affect the performance of a contactor but has not yet been the subject of investigation by the E.R.A., a note to this effect is included.

The curves reproduced throughout the report do not all relate to the same contactor or circuit parameters. They have been selected from test results to illustrate the various points considered. The rate of wear of, say, a 30 A contactor tested at its rated current in a 240 V circuit would clearly be different from that of a 150 A contactor tested at 440 V; hence no great importance should be attached to the values on the curves, which are merely indicative of the magnitude of the effect under the conditions stated.

Letter to the Editor

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

That Bakelite Lampholder

WE are sorry to trespass again on your valuable space, but one aspect of the innocent fun poked by "Ignotus" at the B.S.I. and the "Kitemark" in a recent issue requires correction on a point of fact.

It is quite wrong to say that the B.S.I. does not welcome suggestions from outside. Every Standard is circulated in draft form to a wide range of outside interests; such drafts are frequently publicised in the trade and technical Press and comment invited by that means. As a matter of inviolable rule every draft Standard is listed in the monthly *B.S.I. News*, which circulates among more than 21,000 firms, professional and trade organisations, and other bodies; there is even a substantial circulation overseas of drafts for comment purposes.

If any qualified person then fails to see that his suggestions reach the B.S.I. in good time he can have no one but himself to blame.

London, W.1.

S. G. WILLBY,
Press Officer,
British Standards Institution.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The Electricity Council has appointed **Mr. C. M. de L. Byrde,** M.B.E., M.A., A.C.I.S., to be assistant secretary (administration). Mr. Byrde, who was educated at Bradfield and Oxford, entered the electricity supply industry in 1949 and recently he has been an administrative officer in the Secretary's Office of the Council. During the war Mr. Byrde served in the infantry and on the staff, and after the war he was for a short time with the Ministry of Civil Aviation.

Mr. G. Wray, O.B.E., A.I.M.T.A., D.P.A.(Lond.), F.S.S., has been appointed secretary of the South Eastern Electricity Board in succession to the late Mr. A. L. Burnell. He has been deputy secretary of the Board since 1948.

Mr. G. Wray

Mr. Wray, who is forty-eight, was born in Glasgow and educated at the Creighton School, Carlisle, and the London School of Economics. He began his career in 1926 as a junior clerk in the City Treasurer's office of Carlisle Corporation and seven years later was appointed principal accountancy assistant. In 1934 he went to Guildford Corporation as chief accountancy and audit assistant. Mr. Wray was appointed assistant secretary of the Institute of Municipal Treasurers and Accountants in 1937 and in this sphere was intimately associated with developments in electricity finance and administration in local government. Apart from the war period, he remained with the Institute until 1948 when he became Seeboard's deputy secretary. From 1948 to 1957 he had additional duties as secretary to the South Eastern Electricity Consultative Council. During the war he was on the staff of the Deputy Chief of the Imperial General Staff. He was in both European campaigns, attaining the rank of colonel as a sub-area commander in North West Germany, and he was awarded the O.B.E. and mentioned in dispatches for distinguished service. He is chairman of the Sussex Branch of the Royal Institute of Public Administration.

Mr. C. Corder has been appointed deputy chairman of Oldham & Son (Africa), Ltd., in succession to the late Mr. A. J. T. Goldby. **Mr. A. M. Rosholt,** C.A., has been appointed as financial director, and **Mr. G. A. Curry** has been appointed to the board as a director. Mr. Corder is chairman of the Syfrets Investment Trust, Mr. Rosholt is a partner of Goldby Panchaud & Webber, and Mr. Curry is chairman and managing director of J. H. Vivian & Co., Ltd.

Mr. H. A. P. Caddell, M.A., M.I.E.E., at present manager of the North Staffordshire Sub-Area of the Midlands Electricity Board, has been appointed manager of the South Staffordshire and North Worcestershire Sub-Area, in succession to **Mr. T. G. Keeler,** M.I.E.E., who is retiring at the end of May.

Mr. Caddell is a graduate of Caius College, Cambridge, and received his early training in the electricity supply industry with the former Shropshire, Worcestershire and Staffordshire Electric Power Co., remaining with that company until the industry was nationalised in 1948. He has had previous experience of the area for which he will now be responsible, for he was the company's assistant district manager at Dudley from 1930 to 1933 and in the following three years was commercial assistant at the S.W. & S. headquarters at Mucklow Hill, Halesowen. From 1936 to 1939 he was district manager at Evesham, from 1939 to 1945 district manager at Redditch, Worcs., and from 1945 to 1948 manager of the company's Central Division. From 1945 until its dissolution in 1948 he was a member of the load analysis sub-committee of the Electrical Research Association. He is chairman of the North Staffs Sub-Centre of the Institution of Electrical Engineers. Mr. Caddell has held his present appointment as manager of the North Staffs Sub-Area since vesting date. Following nationalisation he was responsible for the formation of the Sub-Area from eight local authority, Joint Electricity Authority and company undertakings, the setting up of an organisation for contracting and sale of fittings, and for the take-over by the Board of the local organisation of a cable company.

Mr. Keeler's long association with the electricity supply industry began in 1910 in his native Folkestone, where he was an articled apprentice at the power station. After a short period at sea as an electrical engineer, in 1913 he went to Smethwick as a substation attendant for the electric tramways undertaking. Subsequently the undertaking was acquired by the S.W. & S. Electric Power Co., and Mr. Keeler held successive posts until in 1923 he became station superintendent. In 1928 he became the company's district manager at Smethwick and in 1935 was promoted to manager of the Northern Division. Shortly after the industry was nationalised Mr. Keeler was appointed manager of the M.E.B.'s South Staffordshire and North Worcestershire Sub-Area.

Mr. C. C. Pimble, M.I.E.E., M.I.Mech.E., engineer of the North Staffordshire Sub-Area, has been appointed manager of the Sub-Area, to succeed Mr. Caddell, as from 1st June.

Mr. Pimble is a native of Stoke-on-Trent and has been in the electricity supply industry in the area throughout his career. He was educated at Hanley Technical School and North Staffordshire Technical College and afterwards joined the staff of the Stoke Corporation Electricity Department, with which he held successive posts, eventually becoming mains engineer. In 1932 he was appointed distribution engineer to the North West Midlands Joint Electricity Authority. Two years later he was promoted to deputy chief engineer and manager for the Authority, and he remained in this post until the industry was nationalised, when he was appointed sub-area engineer for the Midlands Electricity Board. Mr. Pimble took an active part in the formation of the North Staffs Sub-Centre of the I.E.E. in 1948 and was its first chairman.

Mr. W. H. Grinsted, O.B.E., F.C.G.I., M.I.E.E., director of engineering of Siemens Edison Swan, Ltd., has retired.

Mr. Grinsted received his education at Collyers School, Horsham, and at the Central Technical College (now Imperial College) London, where he held the Clothworkers' scholarship and won the Siemens Medal. After some years with the National Telephone Co., he joined Siemens Brothers & Co., Ltd., in March, 1911, and following a period abroad, studying Continental telephone practice, he established the Engineering Section of the Telephone Department at Woolwich. When Siemens' automatic telephone equipment was first exported to Canada, he was jointly responsible—in addition to looking after the company's telephone interests—for establishing the Winnipeg Branch, now the head office of Siemens Brothers (Canada), Ltd. In the years following his return to this country, as chief engineer, telephones, he played a prominent part in pioneering the development of

Mr. W. H. Grinsted

Siemens various automatic telephone systems, and achieved a world-wide reputation for his work on the application of the theory of probability to telephone traffic problems.

In 1945 Mr. Grinsted was appointed chief engineer of Siemens' reconstituted Telecommunications Department. He was elected to the Fellowship of the City and Guilds of London Institute (F.C.G.I.) in 1950 on the Telecommunications Advisory Committee of which Institute he has served for many years. At the Siemens centenary dinner held on 6th March last Mr. Grinsted received a presentation made to him, on behalf of the directors of the company, by Lord Chandos, chairman of Siemens Edison Swan, Ltd., and of Associated Electrical Industries, Ltd.

Mr. F. P. Liebert, B.Sc.Tech., A.M.I.Prod.E., has been appointed works manager of the Rugby and Whetstone (Leicester) establishments of the English Electric Co., Ltd., and will be responsible to Mr. E. M. Price, general manager, Rugby and Whetstone.

Mr. F. P. Liebert

Mr. Liebert joined the company in 1937 as a graduate apprentice at Bradford and moved to the Rugby works in 1943 where he held progressive positions up to assistant manager (development). When the company took over the Ministry of Supply's Gas Turbine Establishment at Whetstone in 1955 he became manager of these works. He will continue in his new appointment to be responsible for industrial gas turbine activities at Whetstone.

Arising from the development of advanced technological courses, the following appointments have been made to the teaching staff of the Borough Polytechnic:—Senior lecturers in mechanical engineering: **Messrs. C. E. T. Maguire,** B.Sc.(Eng.), A.C.G.I., A.F.R.Ae.S., and **J. F. Douglas,** M.Sc.(Eng.), B.Sc.(Eng.), A.C.G.I., D.I.C., A.M.I.C.E., A.M.I. Struct.E. Lecturer in mechanical engineering and in metallurgy: **Mr. R. A. C. Slater.** Senior lecturer in physics: **Mr. G. F. Filbey,** B.Sc., A.Inst.P. Lecturer in electrical engineering: **Mr. J. S. Vosper,** B.Sc.(Eng.), A.C.G.I., A.M.I.E.E.

The annual dinner of the Scottish Centre of the **Institution of Electrical Engineers** was held at the George Hotel, Edinburgh, on 20th March. The Centre chairman, Mr. E. O. Taylor, presided. The principal guests were Lt.-Col. D. H. Cameron of Lochiel, and Mr. C. T. Melling, a vice-president of the Institution. In proposing the toast of the Institution, Lochiel, who is a member of the British Transport Commission, mentioned the opportunities for all branches of electrical industry afforded by the British Transport Commission's modernisation plan. Mr. C. T. Melling replied to the toast. For the first time in the history of the Scottish Centre, the chairman of the South-East Scotland Graduate and Student Section, Mr. D. Chandra, addressed the members and guests and referred to the work of his section. He thanked the chairman for the encouragement he had given to the Section.

The toast of the guests was proposed by Mr. J. Mendelson, chairman of the South-East Scotland Sub-Centre, and the response was by Lt.-Col. D. A. Collis of Scottish Command. The chairman then made reference to the loss the Scottish Centre would sustain through the departure of Mr. J. L. Egginton, and paid tribute to the work he had done in the formation of the new constitution for the Scottish Centre. He then presented Mr. Egginton with a silver cigarette box, a gift from a number of his friends.

Two new appointments are announced by Frigidaire Division of General Motors, Ltd. **Mr. K. H. Vere,** for the last five years the company's sales promotion and advertising manager, has been appointed marketing manager, and **R. F. Salter,** assistant display manager, has been appointed advertising manager. In addition to his new duties Mr. Vere will continue to have overall responsibility for the company's sales promotion and advertising while Mr. Salter will retain initial responsibility for displays and exhibitions.

Mr. F. H. Pooles, manager of the Derby and Burton Sub-Area of the East Midlands Electricity Board, retired on 31st March after nearly fifty-four years in the industry.

Mr. Pooles served an apprenticeship in mechanical engineering and then went as a pupil to Croydon power station, later holding several appointments at London power stations. In 1915 he joined Birmingham Corporation, taking over general control of the whole of the e.h.v. system in that city, and later becoming assistant resident engineer at Hams Hall power station.

He went to Derby as deputy electrical engineer in 1930 and became engineer and manager in 1939, a position he held until nationalisation. He was chairman of the East Midlands Centre of the I.E.E. in 1935-36 and for the past nineteen years has been chairman of the Derby Branch of the E.I.B.A.

Mr. F. H. Pooles

Mr. F. Overstall

Mr. Pooles' successor as Derby and Burton sub-area manager is **Mr. F. Overstall,** M.I.E.E., who has been manager of the Burton District since the industry was nationalised. He entered the industry in 1927 when he joined the Rawtenstall Corporation as assistant mains engineer. After service at Northampton, Birmingham and Birkenhead he was appointed deputy engineer and manager at Paisley in 1941 and at Peterborough in 1945. He became engineer and manager of the Burton-upon-Trent electricity undertaking in 1947.

On 26th March forty-five employees of **Aron Electricity Meter, Ltd.,** received long-service presentations; the ceremony took place in the company's canteen. Of the forty-five employees, ten have served for over forty years (one for fifty-eight years). In the absence, through indisposition, of Sir Edward Herbert, O.B.E. (chairman), the presentations were made by Major-General J. L. P. Haines, C.B., C.B.E. (managing director).

Mr. O. T. Evans, Assoc.M.C.T., A.M.I.Mech.E., A.M.I.E.E., has been appointed chief engineer of the Electrical General Engineering Department, Metropolitan - Vickers Electrical Co., Ltd., which comprises the Mining and Rolling Mill Divisions.

Mr. O. T. Evans

After gaining early experience with Baldwins Colliery, Ltd., Tondu, South Wales, Mr. Evans went to Trafford Park as a school apprentice in 1943 and, on completing the course, spent a year as a mining trainee, thereafter joining the mining division of the General Engineering Department. Since 1953 he has been responsible for mining development projects, and in August, 1956, was appointed assistant chief engineer (mining), Electrical General Engineering Department. Mr. Evans has presented many technical papers to the Association of Mining Electrical and Mechanical Engineers and has travelled widely on mining business.

The annual dinner of the Plymouth Branch of the **Electrical Contractors' Association** and allied associations was held recently at the Duke of Cornwall Hotel, Plymouth. The guests of honour were the national president, Mr. H. S. Wathes, and the Deputy Lord Mayor of Plymouth, Mr. G. E. H. Creber. The toast to the City of Plymouth was proposed by the Deputy Lord Mayor, and he said that although he was against building "satellite set-ups," he thought most cities the size of Plymouth should have their own electrical engineers. Responding to the

toast, Mr. Wathes said that such organisations as theirs were vital at this stage in the country's history, when it was important that there should be self-sacrifice rather than self-interest. The chairman of the Plymouth Branch, Mr. H. G. Baker, proposed the toast of the guests, and Mr. R. F. Richardson, chief commercial officer, South Western Electricity Board, in his response, said that the Board regarded itself as a partner of the contractors in the great enterprise, which was the electrical industry of to-day.

Mr. J. S. Wilson has been appointed to the board of the Ferguson Radio Corporation, Ltd. He joined Thorn Electrical Industries, Ltd., in 1946 and became sales manager of the Ferguson radio and television division in January, 1956.

The first meeting of the season of the **A.S.E.E. Golfing Society** was held recently at Fulwell Golf Club, when a medal round was played for the G.E.C. Trophy. The winner was Mr. P. J. McArdle; the runner-up Mr. L. A. Grant; and the wooden spoon went to Mr. J. Gillespie. The winner of the visitors' prize was Mr. R. Parker. Other prizes were won by Messrs. W. F. Parker, A. Calley and R. E. W. King. A collection for the E.I.B.A. realised £3. The next meeting will be held at West Herts Golf Club on 16th April.

We are informed that **Mr. S. A. Bergen,** whose appointment as chief development engineer of the Cambridge Instrument Co., Ltd., we reported in our last issue, is an associate member of the Institution of Electrical Engineers, and not a full member as stated.

Mr. P. E. Graham, who joined Ekco-Ensign Electric, Ltd., six years ago as a sales representative, has now been appointed southern district manager within the southern sales area.

Mr. E. S. Evans, general manager of Ekco-Ensign Electric, Ltd., has been appointed to the board of the company. Mr. Evans joined the Lighting Division of E. K. Cole, Ltd., in 1942 and was for some time works manager at Southend. Following the formation of Ekco-Ensign Electric he became sales manager in 1945 and general manager in 1951. After training as an electrical engineer, Mr. Evans joined the E.L.M.A. Lighting Service Bureau on its formation in 1924 and was well known for his lighting development work.

Mr. E. S. Evans

The annual apprentices' evening was held recently at **Hoover (Washing Machines), Ltd.,** Merthyr Tydfil, when a large number of relatives attended the prize distribution. They saw an exhibition of apprentices' work, and a play performed by them. Among those present were Mr. W. J. Dimmock, general works manager, Hoover, Ltd., and director, Hoover (Washing Machines), Ltd., Mr. F. A. Austin, works manager, Hoover (Washing Machines), Ltd., and Mr. I. S. Malcolm, education and training officer. The apprentices' committee chairman, Mr. J. Richards, welcomed the guests. The guest speaker was the Right Reverend Dr. W. G. H. Simon, Lord Bishop of Llandaff.

Mr. M. K. Johnson has been appointed regional lighting superintendent, Midland Region, of the A.E.I. Lamp & Lighting Co., Ltd., in succession to Mr. H. G. Lilley, who is now manager of the company's Lighting Department. Educated at Alleyn's School, Dulwich, and the Borough Polytechnic, London, Mr. Johnson joined Siemens Electric Lamps & Supplies, London, in 1936 as an assistant in the Illuminating Engineering Department. After serving in R.A.F. Bomber Command during the war, he rejoined Siemens in 1946 and was appointed lighting engineer for the Midland Region. In 1952 he joined the Metropolitan-Vickers Electrical Co., Birmingham, in a similar capacity with the added responsibility of street lighting. On the formation of the A.E.I. Lamp & Lighting Co. he became responsible for the company's street lighting activities in an area corresponding with that of the East Midlands Electricity Board.

Mr. M. K. Johnson

Mr. M. Prichard, M.C., deputy managing director of F. Perkins, Ltd., has been appointed joint managing director of the company with **Mr. F. Perkins,** who now becomes chairman and joint managing director. Mr. Perkins, who founded the company in 1932, has decided to relinquish some of his executive responsibilities. **Mr. G. P. Ritchie** has joined the board.

Mr. M. J. Burke, Associate I.E.E., principal assistant engineer (electrical) to the East Anglian Regional Hospital Board, has been appointed to the newly created position of regional engineer. Mr. Burke has been with the Board since 1949.

Mr. G. H. T. Dodge, an electrician employed by the Southern Electricity Board at Salisbury, has been nominated for the position of Mayor of Wilton.

Mr. A. E. Roots, O.B.E., M.I.E.E., manager of the Ayrshire Area of the South of Scotland Electricity Board, has retired after forty-four years in the industry. At a recent presentation dinner he received gifts from the employees presented by Mr. L. Harvey, area engineer, who paid a tribute to his long service to the industry.

The annual dinner of the Bradford Branch of the **Electrical Contractors' Association** was held on 28th March at the Bankfield Hotel, Bingley. Mr. J. Parker (English Electric Co., Ltd.) proposed the toast to the Association and in responding Mr. C. C. Hyams, president-elect of the E.C.A., suggested that the maximum demand tariff was probably the only fair method of charging for electricity. He thought that something should be done regarding off-peak heating, and it was a move which would have to come from the contractors, who had a duty to show consumers that they were using electricity uneconomically. The president, Mr. J. F. Wilson, proposed the toast to the guests, to which Dr. G. N. Patchett, head of the Electrical Engineering Section of the Bradford Institute of Advanced Technology, responded.

Mr. K. P. Wood, B.Sc., A.M.I.E.E., who joined Cossor Radio & Television, Ltd., in 1956, has been elected to the board. He will assist Mr. J. S. Clark, the chairman and managing director, on the management side. Before joining Cossor, Mr. Wood was in charge of the Electrical Engineering Department of the Medway College of Technology, Rochester.

Mr. F. R. Haigh, author of the article on "Overhead Line Economics" (page 638), is senior assistant engineer in the Chief Engineer's Department of the Yorkshire Electricity Board. After taking a B.Sc. (Honours) degree in electrical engineering at Leeds University, Mr. Haigh was employed for a number of years in the Yorkshire Electric Power Co.'s head office at Leeds and in the company's Doncaster district. In 1943 he was appointed senior lecturer in electrical engineering at Wigan and District Mining and Technical College, leaving Wigan in 1946 on being appointed borough electrical engineer of Farnworth, Lancashire. After the nationalisation of the electricity supply industry, Mr. Haigh became installation engineer (appliances) for the Bolton Sub-Area of the North Western Electricity Board and in 1951 was appointed district engineer for the Kearsley District of the Board. He was appointed to his present position in 1954.

Mr. F. R. Haigh

Mr. Haigh has over 20 years' electrical teaching experience to his credit, for in addition to his work at the Wigan College he has held appointments on the evening staff of the

electrical engineering departments of the Technical Colleges at Leeds, Rotherham and Bolton, and he was for a time examiner in Higher National Certificate subjects for the Union of Lancashire and Cheshire Institutes.

OBITUARY

Sir James Swinburne, Bt.—We regret to report the death on 30th March of Sir James Swinburne, Bt., F.R.S. It was only a month earlier that Sir James attained his hundredth birthday and we published some notes on his career in our 28th February issue. By his passing the electrical profession loses its oldest and one of its most distinguished members. He was a past-president of the Institution of Electrical Engineers and of the Faraday Society.

The late Sir James Swinburne

Mr. A. W. Sweetinburgh.—The death occurred on 25th March, at the age of sixty-nine, of Mr. Alfred Weight Sweetinburgh, A.M.C.T., A.M.I.E.E., who in 1955 retired from the position of transmission engineer to the Eastern Division of the Central Electricity Authority.

Public Supply in Sarawak

The British colony of Sarawak, on the north-west coast of Borneo, has had a public electricity supply for many years but the annual report just received from the Government-owned supply company is the first to be issued. A section is therefore included briefly outlining the history of electricity supply since the Public Works Department opened an electrical section in 1924 and the first two 250 kW d.c. sets, driven by steam engines with oil-fired boilers, were started up at Kuching.

When the Sarawak Electricity Supply Co. was formed in 1932 the $300,000 share capital was divided between the Government (51 per cent) and United Engineers, Ltd. (49 per cent). After the war differences of opinion arose over the financing of the extensions needed to meet the increased demand, culminating in the purchase by the Government, in 1953, of the shares owned by United Engineers. Acknowledgment is made in the report of the public spirit shown by the company in agreeing to advance a large sum of money for development work while the dispute was in progress.

Since 1953 electricity consumption has expanded at an average rate of 20 per cent, sales during the year ended 30th June last totalling 9·3 million kWh. In 1956-57 the number of consumers increased from 7,144 to 8,543. Total generating capacity is now 5,881 kW. It is planned to build a new power station with three 1,350 kW sets at Sungei Priok to replace the two stations at Kuching and 7th Mile.

The report includes a number of illustrations of generating plant and overhead line construction as well as a chart of a typical load curve for Kuching power station. This shows that between 6 p.m. and 7.30 p.m. the load rises sharply to 2,000 kW from the day-time level of 1,000 kW, then falls to just under 500 kW.

Battery-Operated Railcar

THE first electric battery railcar to be seen in Great Britain (although they have been in operation in Germany for some years) was demonstrated in Scotland last week. The vehicle is to operate on the Aberdeen-Ballater branch.

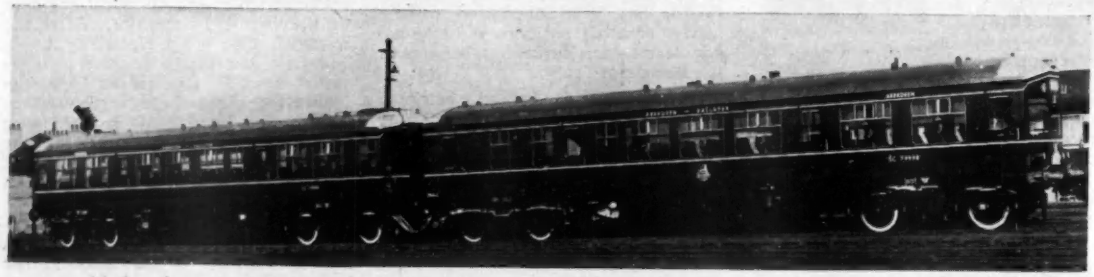
This experiment in rural rail transport is a result of collaboration between the British Transport Commission, the North of Scotland Hydro-Electric Board, Bruce Peebles & Co., Ltd., and Chloride Batteries, Ltd. If it is successful it may provide a solution to some of the problems of maintaining rail services on uneconomic branch lines.

The distance from Aberdeen to Ballater is 43¼ miles and the car batteries will be charged at Aberdeen and again at Ballater. The maximum gradient is 1 in 68 so that the powers of acceleration of the vehicle and ability to climb will be amply tested. There are twelve intermediate stations on the branch and there is a fair passenger traffic, capable of being increased.

Most of the power for the batteries can be taken in off-peak hours. The new vehicle, a twin-coach unit, will seat 117 passengers and will have a top speed of over 60 m.p.h. The North of Scotland Hydro-Electric Board is to supply electricity at special rates and will be responsible for the electrical feed equipment. Bruce Peebles are supplying charging plant at Aberdeen and Ballater and Chloride Batteries are providing the batteries for the vehicle, which was assembled at British Railways Carriage Works, Cowlairs. The control equipment, manufactured by Siemens-Schuckert (Germany) and Schaltbau (Germany), was supplied by Siemens-Schuckert (Great Britain), Ltd.

The train consists of two carriages of the type used in the lightweight multiple-unit diesel train. The carriages have been modified to accommodate electric batteries and driving control gear and specially strengthened to take the weight of the equipment. The two 100 kW electric motors are fitted to a bogie of one of the coaches and are controlled from the driving compartments at each end of the train. The battery is installed in sections of 8 tons under each coach, and is arranged in cradles which can be partially withdrawn for maintenance and inspection purposes. It consists of 216 lead-acid cells connected so as to give a nominal voltage of 440 with a capacity of 1,070 Ah.

Control is by series/parallel arrangements with three positions of field weakening and with facilities for cutting out either motor. Smooth acceleration is obtained by cam-operated contactors driven by an electric motor whose speed is automatically regulated by the traction motor current.



The new Scottish battery-operated railcar

INDUSTRIAL NEWS

F.B.I. Annual Report

The annual report of the Federation of British Industries, which is to be presented to the annual general meeting on 9th April, states that the need to halt inflation was one of the main concerns of the Federation during the whole year, and that they repeatedly pointed out that high Government and other public spending was at the root of inflationary trouble. During the year the Federation was also greatly exercised over the problems involved in Britain's possible entry into a European Free Trade Area, and its main task was to impress on the Government the conditions and safeguards that would be necessary. In the field of export trade promotion the report refers to the Helsinki Fair, the three British trade weeks in South Africa, the Chinese Technical and Economic Mission, and the Canadian Government Mission. Among the innumerable activities on the home front are the evidence presented to the Trade Effluents Sub-Committee of the Central Advisory Water Committee and the satisfactory conclusion of the negotiations with the Ministry of Education on the financing of sandwich courses.

The F.B.I. have also published a booklet, *Fighting Inflation* (price 2s), which provides a brief restatement of their economic policies.

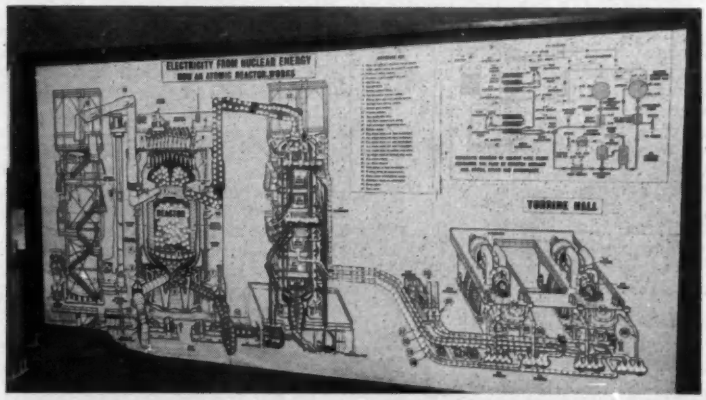
Self-Service Display in Scotland

Five companies with interests in self-service are combining to stage the first self-service display to be held in Scotland. It will be held at the Partick Hall, Glasgow, from 9th to 19th April, and is intended for members of the retail food trades and the electrical trades who will be requested to attend by invitation. The five participating companies are British Cellophane, Ltd., the Frigidaire Division of General Motors, Ltd., the National Cash Register Co., Ltd., Philips Electrical, Ltd., and Frederick Sage & Co., Ltd.

Electrical Contracting Apprenticeship

Last year the scheme of registration of apprentices in the electrical contracting industry initiated in 1950 and administered by the Apprenticeship and Training Council was withdrawn. The National Federated Electrical Association also gave six months' notice to terminate the national apprenticeship agreement and put forward proposals for a revised scheme, including provision for two grades of apprentices, which were not acceptable to the Electrical Trades Union. It is now reported that agreement has been reached between the N.F.E.A. and the E.T.U. for the introduction, pending further negotiations, of a temporary registration scheme. The notice to terminate the apprenticeship agreement (as from 31st March) is being suspended for three months and if negotiations are not complete at the end of that time there will be a further three months' suspension.

Negotiations are to be resumed on the proposals for a revised apprenticeship scheme, the matters to be discussed including the introduction of a system of central registration; method of recruiting apprentices; facilities for training; and the ratio of apprentices to journeyman labour.



This animated diagram of the Calder Hall nuclear power plant appeared on the stand of the Central Electricity Generating Board at the Electrical Engineers' Exhibition. Although no indication was given, readers will recognise that it was based on the drawing published in the "Electrical Review" of 19th October, 1956

United Insulator Co.

The United Insulator Co., Ltd., ceased to trade as such on 31st March, and is now known as the U.I.C. (United Insulator Division) of the Telegraph Condenser Co., Ltd. The Chessington factory will continue to manufacture and supply all those products made in the past, and the re-grouping will enable the company to command better facilities. The buying will be done from the head office of the Telegraph Condenser Co., at Wales Farm Road, North Acton, London, W.3, but goods should be delivered to Chessington. Accounts outstanding at 31st March against the United Insulator Co., will be settled in the normal way, but by the Telegraph Condenser Co., from its Acton address.

Camshaft Controllers for London Transport

The General Electric Co., Ltd., has received an order from the London Transport Executive for seven equipments which incorporate camshaft controllers of the pneumatic pawl escapement type (designated P.P.E.) for installation in surface line rolling stock. A prototype has been in service on the Piccadilly Line of London Transport for twelve months. This type of controller is electro-pneumatic in operation, incorporating an escapement which provides smooth progression without the use of a damping fluid.

Large Argentine Project

General Pedro Aramburu recently laid the foundation stone of South America's largest thermo-electric power station, a £50 million project to be carried out mainly by British concerns. The principal contracts were placed with the British Thomson-Houston Export Co. and International Combustion (Export), Ltd., with substation plant by the Metropolitan-Vickers Electrical Co. The 600 MW station will almost double the power supply of greater Buenos Aires.

Clean Air Regulations

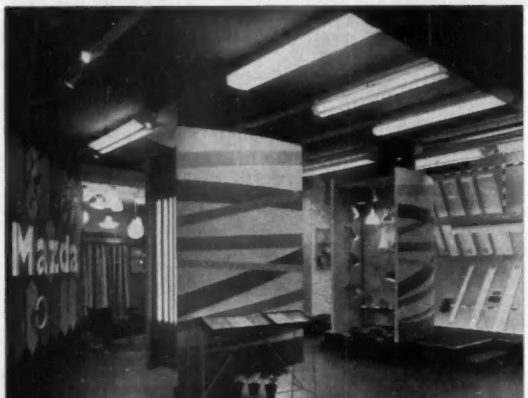
The Minister of Housing and Local Government has made regulations which set limits to the emission of dark smoke from chimneys which will be allowed after 1st June. It will then be an offence under the Clean Air Act to emit dark smoke from chimneys, except as permitted by the new regulations (S.I. No. 498, The Dark Smoke (Permitted Periods) Regulations, 1958, H.M. Stationery Office, price 3d). Dark smoke is defined as smoke as dark as or darker than Shade 2 on the Ringelmann Chart. The regulations are to meet the case of dark smoke which is unavoidably caused by such essential operations as cleaning the fires of furnaces. House chimneys, while subject to the ban on dark smoke, in practice rarely produce it, but the regulations would apply to them.

The Minister has also made an order

(S.I. No. 497, The Alkali &c. Works Order, 1958, price 3d) extending the list of works which are scheduled under the Alkali, &c. Works Regulation Act, 1906, and the list of noxious or offensive gases contained in it. The additional processes, operations and gases are given in full in the order. Briefly, they include certain processes or industrial operations at iron works, steel works, copper works, aluminium works, electricity works, ceramic works, gas and coke works, producer gas works, lime works, and at specified chemical works. As a result of the order air pollution from these processes and operations will be controlled under the Alkali Act instead of the Clean Air Act, and by the Government's Alkali Inspectorate rather than by the local authorities.

A.E.I. Lighting Exhibition

An exhibition of lamps and lighting equipment has been opened by the A.E.I. Lamp & Lighting Co., Ltd., at the Mazda showroom, Crown House, Aldwych, London, W.C.2, to serve as a ready reference to its lighting equipment, with the exception of street lighting. This display will remain open through the summer months. Flexibility, the theme of the display, is demonstrated in the fluorescent, commercial and industrial ranges, in the range of fluorescent "module" fittings for use in recessed ceilings, and by the three systems of lighting trunking—invertrunking, shallow trunking and universal trunking. A wide range of fluorescent fittings is shown mounted on the permanent installation of invertrunking. A special section is devoted to the method by which the "family" range of fluorescent, industrial and commercial fittings are assembled on a basic power pack with interchangeable additional parts. There are also displays devoted to "Satina" glass shade fittings. Industrial tungsten and mercury vapour reflector fittings are shown in a separate section, together with a selection of six floodlight fittings chosen to cover nearly every floodlighting application and a complete range of gripper handlamps. Examples of commercial glassware fittings are also on show.



The lighting exhibition opened by the A.E.I. Lamp & Lighting Co., Ltd., at Crown House, Aldwych, W.C.2

Isotope Courses at Harwell

A course on radioisotopes designed to give senior executives in industry an appreciation of the possible applications of those materials will be held at the Harwell Isotope School from 23rd to 26th September. Two similar courses have been arranged (15th to 18th April and 8th to 11th July) for members of the Institute of Directors only. The course consists of lectures on the elementary principles of work with radioactive isotopes with the emphasis strongly towards their application as tools in industry and research. The lectures will be given in as non-technical a manner as possible by scientists experienced in the field: they will be supplemented by visits to a reactor and to the laboratories of the Isotope Division at Harwell and at the Wantage Radiation Laboratory near Harwell. The lectures and demonstrations will be given in the Cockcroft Hall at Harwell.

Over the period of the conference delegates will stay in an Oxford college. The fee for the course, including accommodation, meals, transport and lectures, is £40, payable in advance. Application forms are obtainable from the Registrar, Isotope School, Atomic Energy Research Establishment, Harwell.

New Reactor

A new zero-energy reactor is now operating at the Atomic Energy Research Establishment at Harwell. Known as "Hazel" (Homogeneous Assembly—Zero Energy), this reactor uses enriched uranium fuel in the form of a salt of uranium curanyl fluoride which is dissolved in the heavy water used as a moderator. The core of the reactor is a stainless steel cylinder (7ft high by 2ft in diameter) surrounded by a graphite reflector. The fuel solution is pumped into the cylinder from two nearby storage vessels.

The system is controlled by adjusting the level of the fuel solution in the reactor vessel and by moving a vertical neutron-absorbing cadmium plate in the gap between the steel cylinder and the graphite reflector. Two cadmium plates similar to the control device are used as "shut-off" rods: two additional rods can be dropped vertically into the fuel solution in the reactor vessel. The reactor will be operated at a power of less than a watt and cooling is not necessary.

"Hazel" will be used to obtain basic nuclear information. An earlier system at Harwell, ZETR (Zero Energy Thermal Reactor), was used to study solutions of nuclear fuel in ordinary water.

Steel Prices Reduced

Last week the Iron and Steel Board announced reductions in the prices of most steel products, to take effect from 30th April. The reductions range from 1 to 3 per cent and are estimated to save industry about £10 million a year. They have been made possible by lower costs of imported materials and the reduction in steel imports, although there is a partial off-set from higher labour costs.

Prices of Materials

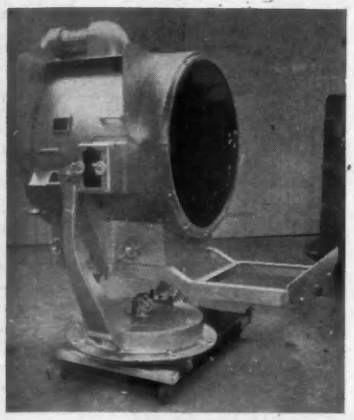
In the accompanying table we give the basic prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £180 0s 0d
COPPER, H.C. Electro	ton £177 5s 0d
Fire Refined 99·70%	ton £176 0s 0d
Fire Refined 99·50%	ton £175 0s 0d
COPPER Tubes ..	lb 1s 8½d
Sheet	ton £205 5s 0d
H.C. wire and strip ..	ton £225 15s 0d
LEAD, English ..	ton £73 10s 0d
Foreign	ton £72 0s 0d
MERCURY	flask £77 0s 0d
TIN, block (English) ..	ton £730 5s 0d
ZINC, G.O.B. Foreign	ton £63 5s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 1s 5d
Sheet	ton —
Wire	lb 2s 3½d
PHOSPHOR BRONZE Wire	lb 3s 6d
PLATINUM	oz £26 15s 0d
RUBBER, No. 1 R.S.S. spot	lb 23d—23½d

Aluminium, Ltd., has reduced the price of aluminium by 2 cents per lb, or a little over £16 a ton, as from 1st April. It is stated that this will bring the price down to that quoted for Russian aluminium. An application had already been made to the Board of Trade for the imposition of an anti-dumping duty on Russian aluminium.

Floodlights for Niagara Falls

The Niagara Falls are to be illuminated by Savage AI floodlights, made by Savage & Parsons, Ltd., of Watford, Herts. The twenty lighting units, each of 210 million beam candlepower, in manufacture at Watford are as powerful as the most up-to-date searchlights of comparable size made by the same company for military use. In addition, this latest design incorporates unusual modifications to meet the special conditions at Niagara, including ultra-thin lamp column, easy weather-protected maintenance requir-



One of the Savage & Parsons floodlights for the Niagara Falls

ing virtually no tools, and general sturdiness. The designer of the projectors is Mr. S. Storey, the chief draughtsman. Both the Canadian and American Falls will be illuminated, and the projectors are being fitted with automatic colour change units to provide numerous lighting effects; they will be mounted in Queen Victoria Park, averaging 1,700ft from the Canadian Horseshoe Falls and 2,500ft from the American Falls. The contract, valued at £55,000, was awarded to a Canadian associate of the General Electric Co., Ltd., for whom Savage & Parsons, Ltd., have designed and manufactured the units.

E.D.A. at Health Congress

The Electrical Development Association is taking part in the Royal Society of Health Congress (Eastbourne, 28th April to 2nd May). Although concentrating mainly on electric catering, its display on smoke abatement will also form an important part of the stand.

Mechanical Handling Exhibition

More than 250 firms will be participating in the Mechanical Handling Exhibition which is being held at Earls Court, London, from 7th to 17th May. The exhibition will occupy more than half a million sq ft of floor space and will, for the first time, include displays of equipment from overseas countries, including America, France, Italy, Germany and Scandinavia. The exhibits will cover the whole field of mechanical handling from small lift trucks and loaders to conveyors, aerial ropeways, cranes and complete factory installations. A wide range of accessories and appliances associated with mechanical handling will also be shown including electrical and electronic control equipment.

As in previous years a Convention has been arranged to run concurrently with the exhibition and among the seven papers is one on "The Applications of Mobile Equipment in Power Stations," by Mr. A. Szold, of the C.E.G.B. Tickets of admission can be obtained free of charge from Mr. H. A. Collman, *Mechanical Handling*, Dorset House, Stamford Street, London, S.E.1.

A good idea of the scope of the exhibition and of the extent to which mechanical handling techniques can be applied in industry is provided by the 16 mm colour film "Mechanical Handling on Show," which forms a pictorial record of some of the main exhibits at previous shows. The film lasts for 40 minutes and is available free on loan from *Mechanical Handling*.

G.E.C.-Lumenated Ceilings Agreement

The General Electric Co., Ltd., and Lumenated Ceilings, Ltd., announce that they have agreed to combine design and development resources to provide a nation-wide service for the marketing and application of "lumenated" ceilings.

Multi-Channel Radio Link

The largest radio telecommunications system of its type in the world was inaugurated recently in Nigeria by the Nigerian Minister of Communications and Aviation, Chief the Honourable S. L. Akintola. Marconi's Wireless Telegraph Co., Ltd., have been responsible for the construction of the whole system, which is capable of providing an ultimate capacity of over 50,000 channel miles, and Marconi v.h.f. multi-channel equipment has been used at all the 14 terminal and 25 repeater stations.

With the completion of this scheme it is now possible to telephone from Lagos to many provincial towns whose local services have not previously been connected into a national network.

Marconi Instruments Extension

An extension of 22,000 sq ft has recently been completed at the St. Albans factory of Marconi Instruments, Ltd., and in the accompanying picture we illustrate part of one of the laboratories. Well over 100 different types of Marconi instruments are now available.

Chemical and Petroleum Engineering Exhibition

The Chemical and Petroleum Engineering Exhibition will be held at Olympia, London, from 18th to 28th June. It has been organised by F. W. Bridges & Sons, Ltd., Grand Buildings, Trafalgar Square, London, W.C.2, with the support of the British Chemical Plant Manufacturers' Association and the Council of British Manufacturers of Petroleum Equipment. A number of electrical manufacturers are exhibiting. During the exhibition a conference on "The Organisation of Chemical Engineering Projects," arranged by the Institution of Chemical Engineers, will be held.

Instrument Display

The eighth display at the Instrument Centre, the exhibition room at SIMA House, 20, Queen Anne Street, London, W.1, headquarters of the Scientific Instrument Manufacturers' Association, recently opened with products on show from eighteen members of the Association. Admission to the display (open until the end of April) is free. Covering a wide range of types, it gives a good cross-section of British instruments available in the fields of optics, electronics, laboratory apparatus, surveying, meteorology, nucleonics, and for various aspects of industry.

Batti-Wallahs' Society

The original members of the Batti-Wallahs' Society were all P. & O. men, and it was appropriate therefore that at last week's luncheon of the Society the guest speaker should be Captain T. A. Sergeant, who was connected with the P. & O. Company for thirty-five years. He is now one of the Elder Brethren of Trinity House, and his address was on the "Whys and Wherefores" of this ancient institution. He traced its history from the granting

One of the laboratories which forms part of the new extension to the factory of Marconi Instruments, Ltd., at St. Albans

of its charter by Henry VIII in 1514 to the present day, and mentioned many little-known facts about its activities and constitution. Dr. L. G. Brazier (president) introduced the speaker. The next luncheon of the Society will be on Wednesday, 30th April, when the guest speaker will be Sir Miles Thomas.

Copper Busbars

Thomas Bolton & Sons, Ltd., have issued a booklet giving brief particulars and illustrating their h.c. copper busbars, including rectangular sections, switch leaves, flexible connections, and cellular conductors for e.h.v. busbars and connections to outdoor substations. Mention is made of the company's research services and pre-assembly facilities available in their works for bending, sawing, drilling, slotting, and tinning to customers' requirements.

Engineering Design

A conference on appearance design of light engineering products will be held on 15th April at the Berkeley, 26, Berkeley Square, Clifton, Bristol. The conference has been organised by the Regional Council for Further Education for the South West in collaboration with a number of other bodies. The fee is £1 1s and full particulars and application forms can be obtained from the secretary of the Council, 12, Lower Castle Street, Bristol, 1.

Exhibition of Portable Safety Lamps

A private exhibition showing the complete range of "Nife" portable safety lamps and accessories for industry, together with specially designed charging and maintenance equipment, is to be held in the Conference Room of the Waldorf Hotel, Aldwych, W.C.2, from 22nd to 25th April. Tickets can be obtained from Nife Batteries, at Redditch, Worcs., or 53, Victoria Street, S.W.1 (telephone: Abbey 1412).

Technical Teachers' Views

Booklets on "Sandwich Courses" and "The Education of Boys and Girls between the Ages of 15 and 18" have been received from the Association of Teachers in Technical Institutions, Hamilton House, Mabledon Place, London, W.C.1. The first sets out the views of the Association on the best way to secure the expansion of sandwich courses. It considers the limitation of such courses to Colleges of Advanced Technology and Regional Colleges to be unduly restrictive and advocates the extension of the system to other establishments. It also thinks that "works-based" sandwich courses will not cover the many small firms who cannot afford to institute them and recommends that there should be a wide provision for "college-based" schemes. Other points are co-operation between employers and college staff; the recruitment of suitable students from secondary modern schools; improved grants to students; better conditions for college staff; and commerce and management studies. Examples of existing sandwich courses are outlined in an appendix.

The other booklet is a memorandum of evidence submitted to the Central Advisory Council for Education (England) and deals with the subject under three main heads:—Education in the schools; school leaving; and further education.

Radio-Telephone Equipment for the Azores

A further contract has been awarded to Marconi's Wireless Telegraph Co., Ltd., by the Portuguese Postal and Telegraph Authorities for multi-channel v.h.f. radio-telephone communication equipment for the Azores.

Marconi's have previously carried out the inter-island installation between Santa Maria and Sao Miguel, and are at present installing links between Sao Miguel and Terceira, and Terceira and Faial. The new contract calls for installations between the islands of Terceira and Graciose, Faial and Sao Jorge and Faial and Pico. The equipment will provide a capacity of at least 16 channels, although only three or four will be used initially, the number being increased as traffic demands dictate.

As with the earlier orders, the installations will be in duplicate, with standby equipment coming into operation in the event of breakdown along the main route. Twelve Marconi Type HM181 terminal equipments will be used for the radio paths, in conjunction with six carrier equipments, Type R40A, manufactured by the Telephone Manufacturing Co., Ltd. Three 4 kVA Lister diesel alternator sets are also to be supplied. The value of the order is £40,000.

"Terylene" in Industry

Imperial Chemical Industries, Ltd., have published a new edition of its multi-lingual booklet, "'Terylene' in Industry," which describes the applications of this synthetic fibre in various industries including insulation fabrics.

Science Teachers and National Service

In the report bearing this title in last week's issue reference was made to Mr. Robert Carr, Parliamentary Secretary to the Ministry of Education. Mr. Carr is actually Parliamentary Secretary to the Ministry of Labour and National Service.

Automobile Service Equipment

Crypton Equipment, Ltd., Bristol Road, Bridgwater, Somerset, has issued three new publications of particular interest to those connected with servicing in the automobile industry. The first, "The Importance of Service," emphasises the benefits to be obtained by setting up a diagnosis department, divorced from repairs. "Presenting Performance Service" describes the Crypton "Motormaster" tune-up tester, and "Performance Service Equipment" describes the company's electronic servicing equipment.

Train Inquiry "Robot"

A recorded voice which will reassure telephone callers waiting for the Southern Region's central train inquiry bureau came into action at Waterloo Station on 25th March. The voice—a special recording—plays automatically to callers when all the staff in the bureau are already busy answering telephone inquiries. It tells them to hold on and promises that their calls will be automatically put through as soon as a line is clear. The equipment consists of two voice-recording machines—one in use and one in reserve—specially fitted with repeating apparatus which allows the playing arm to be perpetually transferred from the end of the recording to the commencement.

Calendar

The Metropolitan-Vickers Electrical Co., Ltd., has sent us its "girl" calendar for April, 1958, to March, 1959. Miss Elizabeth Duke, a photographer's model, has been chosen as this year's subject and she is a worthy successor to the long line of M-V calendar girls.

Trade Announcements

Sam Mozer, Ltd., 288, Hedge Lane, London, N.13 (telephone: Palmers Green 1748), has been appointed distributor by **Ardente Acoustic Laboratories, Ltd.,** for its miniature electronic components. Inquiries from manufacturers should continue to be addressed to Ardente Acoustic Laboratories, Ltd., 8-12, Minerva Road, London, N.W.10.

Multimusic, Ltd., a new subsidiary company of Multicore Solders, Ltd., will in the near future introduce Britain's first weekly service of background music on tape for reproduction in public. Installations will be handled through public address equipment manufacturers, who will negotiate the rental contracts for the tapes which will be signed between the subscriber and Multimusic, Ltd.

From 7th April the address of the Dundee branch office of **British Insulated Callender's Cables** will be 2, South Ward Road, Dundee (telephone: 5926/7).

Ambassador Radio & Television, Ltd., has appointed Mr. H. J. Saar as representative in the London area. He was previously with the company for a number of years before leaving for a period with Amplion, Ltd.

Change of Name

T.D.L. Electrical Distributors, Ltd., Bristol, has changed its name to Rota Electric (Bristol), Ltd.

NEW ELECTRICAL EQUIPMENT

Barrel Pumps

A new range of portable electric barrel pumps introduced by the BRITISH CENTRAL ELECTRICAL CO., LTD., 6 & 8, Rosebery Avenue, London, E.C.1, is primarily intended to cope with the more viscous liquids which are beyond the scope of the company's earlier model. The maximum motor loading has been increased to 400 W and a cooling fan has been added. The lifting tube and the inner tube containing the driving shaft for all lengths and types are interchangeable and the same pump can be used for water, oils, etc.

By the replacement of the tube assembly with one made from austenitic stainless steel the pump can be used for acids or other corrosive liquids. A pump (type 400-N) with a 2ft 3in lifting tube suitable for entry into a normal barrel with the entry on the side is priced at £35 10s. A similar unit, but with a stainless steel tube (400-S), is £58 10s.

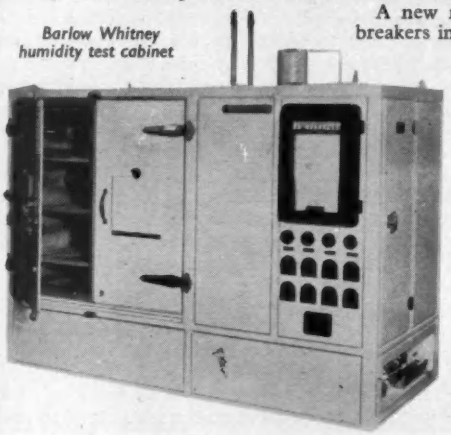
Humidity Test Cabinets

Three larger models of their HTC humidity test cabinets are announced by BARLOW WHITNEY, LTD., Coombe Road, Neasden, London, N.W.10.

The new units are catalogued under references HTC 5, 6 and 7 and the respective internal dimensions are 36in cube, 54in wide by 36in high by 36in deep, and 72in wide by 36in high by 36in deep. They incorporate highly accurate yet flexible control of both temperature and humidity and are entirely self-contained, only requiring connection to electrical and water services and provision for drainage. The interiors are constructed from heavy tinned copper which has excellent thermal and corrosion resisting characteristics.

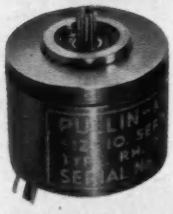
The control system comprises adjustable electrical thermometers, relays and input regulators catering for dry heat temperatures from ambient to 100 deg C. Relative humidity conditions from 40 per cent to 99 per cent can be produced with temperatures to 70 deg C. Provision is also made for controlled cyclic temperature variation under damp heat conditions adjustable for both amplitude and frequency.

Barlow Whitney humidity test cabinet



Servomotors

The range of a.c. servo-components made by R. B. PULLIN & CO., LTD., Phœnix Works, Great West Road, Brentford, Middlesex, has been increased by the introduction of the Pullin-Kearfott size 10 servomotors. Each of three types consists of a two-phase a.c. (400 c/s) stator and a high resistance squirrel cage rotor mounted on precision stainless steel ball bearings, in a corrosion resistant housing.



Pullin-Kearfott size 10 servomotor

The stator assembly has a straight-through bore, reducing the airgap and providing greater efficiency. The motors are approximately 1in in diameter.

The type RH118 is suitable for standard applications and for high temperature operation (up to 175 deg C). The control and reference phases are 26 V each.

For use with germanium transistors, type R124G with 24 V centre tapped control phase and with 26 V on the reference phase is suitable. The type R124S for silicon transistors with 40 V centre tapped control phase will be available shortly.

Miniature Circuit-Breakers

A new range of miniature circuit-breakers in ratings up to 60 A and for supplies at up to 500 V a.c. has been introduced by J. A. CRABTREE & CO., LTD., Lincoln Works, Walsall, Staffs. In a series of tests carried out at the Crompton Parkinson ASTA approved short-circuit testing station the breaking capacity at 250 V a.c. (0·7 to 0·8 p.f.) was certified at 4,000 A.

The mechanism of the type F-60 miniature circuit-breaker is designed to ensure unfailing operation despite vibration or the long periods of inactivity usually imposed upon protective switchgear. Movement of the breaker is positive in both "make" and "break." It is impossible for the operator to hold the circuit-breaker in the closed position under fault conditions.

Tripping under fault conditions is achieved by a simple, hermetically sealed, time-delay device embodying the magnetic-hydraulic principle now widely employed in larger control gear. It will tolerate harmless temporary overloads, such as initial switching surges, but it will trip instantly on heavy overloads or short-circuit faults. All breakers are supplied as standard with a tripping mechanism having an inverse time characteristic. The silicone time-delay fluid used has a substantially flat temperature-viscosity characteristic: the degree of overload protection is therefore unaffected by normal variations in ambient temperature.

The operating mechanism and arc chambers of the circuit-breaker are separated from the cable terminals and fixing screws. Wiring and erection are simple. The main supply cables are brought in to substantial terminals which lie in a protected chamber at the top; the circuit cables are introduced into a similar chamber at the bottom of the unit. All terminals are readily accessible from the front. Cable entries are sealed by tight-fitting rubber grommets. Special extended terminal covers are available for use with t.r.s. cable or conduit on s.p. and n. and d.p. units.

Crabtree type F-60 miniature circuit-breaker

Carpet Underlay

The "Thermalay" electrically heated carpet underlay is now available from THERMALAY, LTD., Shelf Mills, Shelf, nr. Halifax, Yorks., in four sizes, measuring 3 yd by 2½, 3, 3½ and 4 yd, respectively. The underlays are manufactured from a good quality carpet underfelt and are claimed to maintain a room temperature of 70-75 deg F. The heating element is a continuous coil of low temperature plastic-covered wire and models are available for use on 220 and 240 V. The loading on the 3 yd by 3 yd type is 960 W.

Each underlay is supplied with 2 yd of flex and the prices range from about £20 upwards.

Electrical Engineers' Exhibition

SURVEY OF THE EARLS COURT DISPLAY

ELECTRICAL equipment and associated apparatus valued at well over £2 million was displayed at the seventh annual Electrical Engineers' Exhibition, held at Earls Court, London, last week, which was "previewed" in our issue of 21st March. Many thousands of items of equipment were on view, ranging from transistors and miniature relays to large apparatus such as the 25ft high circuit-breaker shown by Metropolitan-Vickers and the 860 h.p. motor of Laurence, Scott & Electromotors, Ltd., which because of its weight and size could not be taken into the building. This motor did, however, make an impressive exhibit at the entrance to Earls Court. Without doubt, this year's display was the largest exhibition ever staged by the electrical manufacturers of this country and more than 400 firms took part, their stands occupying an area of over 450,000 sq ft, the whole of Earls Court, in fact.

The high level of stand design reached by the last two exhibitions in the series was very well maintained and there was great variety in appearance, which with liberal and tasteful use of colour and lighting, created a most pleasing overall effect. As in previous years, however, the actual layout of the exhibition could well have been improved in some respects. On entering the main doors, one encountered a confusing number of small stands and there seems to be no good reason why a more striking arrangement could not have been adopted here. Another irritating thing for visitors, who can rarely afford to waste their time by getting lost amongst a maze of stands, was the rather ineffective signposting throughout the exhibition. The aisles were not at all clearly marked and those exhibitors who did go to the trouble of displaying their stand numbers made them so small that they could only be identified with difficulty and could certainly not be seen from a distance.

Previous exhibitions seem to have set a definite pattern for the display and as in other years, switchgear, electrical accessories and lighting fittings appeared to predominate. From conversations we had with a large number of the exhibitors there is no doubt that the accent of the show was on selling and because of this there was very little equipment on view which was completely new. Many of the equipments displayed were improved versions of well-established designs to meet the requirements of customers in all parts of the world. The Earls Court display impresses one with the ingenuity and competence of British electrical designers. This, no doubt, accounts for the fact that the electrical industry is the most successful exporting industry in the United Kingdom.

Ferguson Pailin 3·3kV, 250 MVA, 1,600A air-break switchgear

One of the special features of this year's exhibition was the display "Electricity in Hospitals" occupying a stand having an area of some 10,000 sq ft. This showed how electrical equipment can be of value in all branches of medicine. Another interesting section nearby was devoted to education and training. Supported by Government Departments, H.M. Armed Forces and technical and educational organisations, as well as by many leading electrical associations, these stands contained a wealth of information for prospective engineers.

Switchgear

As we have already indicated, a major proportion of the floor area of the exhibition was, once again, occupied by switchgear which ranged in size from the domestic light switch, fuse-switch units and l.v. circuit-breakers to a single-phase assembly of a 330 kV, type GA 11W8 air-blast circuit-breaker made by Metropolitan-Vickers. This unit, the largest exhibit in the hall, stood over 25ft high and weighed 12 tons. It is part of a three-phase circuit-breaker, ten of which are destined for the Snowy Mountains Hydro-Electric Authority, Australia. The maximum continuous rating is 1,200 A and the breaking capacity is 10,000 MVA at 330 kV.

An air-break switch unit, the type ASB37 rated at 250 MVA at 3·3 kV, was exhibited for the first time by Ferguson Pailin, Ltd. This unit, which is suitable for the control of power station auxiliaries, incorporates a facility for earthing either the feeder or busbar circuit without removing the switch truck from the housing or removing or adding any current-carrying parts. A mechanically-driven mimic diagram on the flush-fitting front door of the cubicle shows the position of the switch circuit connections. The switch truck is particularly manœuvrable due to the castor action of the front wheels which allow the truck to be withdrawn from the housing at an angle.

Another air-break switch unit was shown by A. Reyrolle & Co., Ltd. This unit, the Class SA, is rated at 250 MVA at 6·6 kV. An integral earthing feature enables the circuit-breakers to be plugged into normal circuit, feeder-earth or busbar-earth positions by hinged plug isolating contacts. Epoxy-resin insulation is used extensively in the unit.

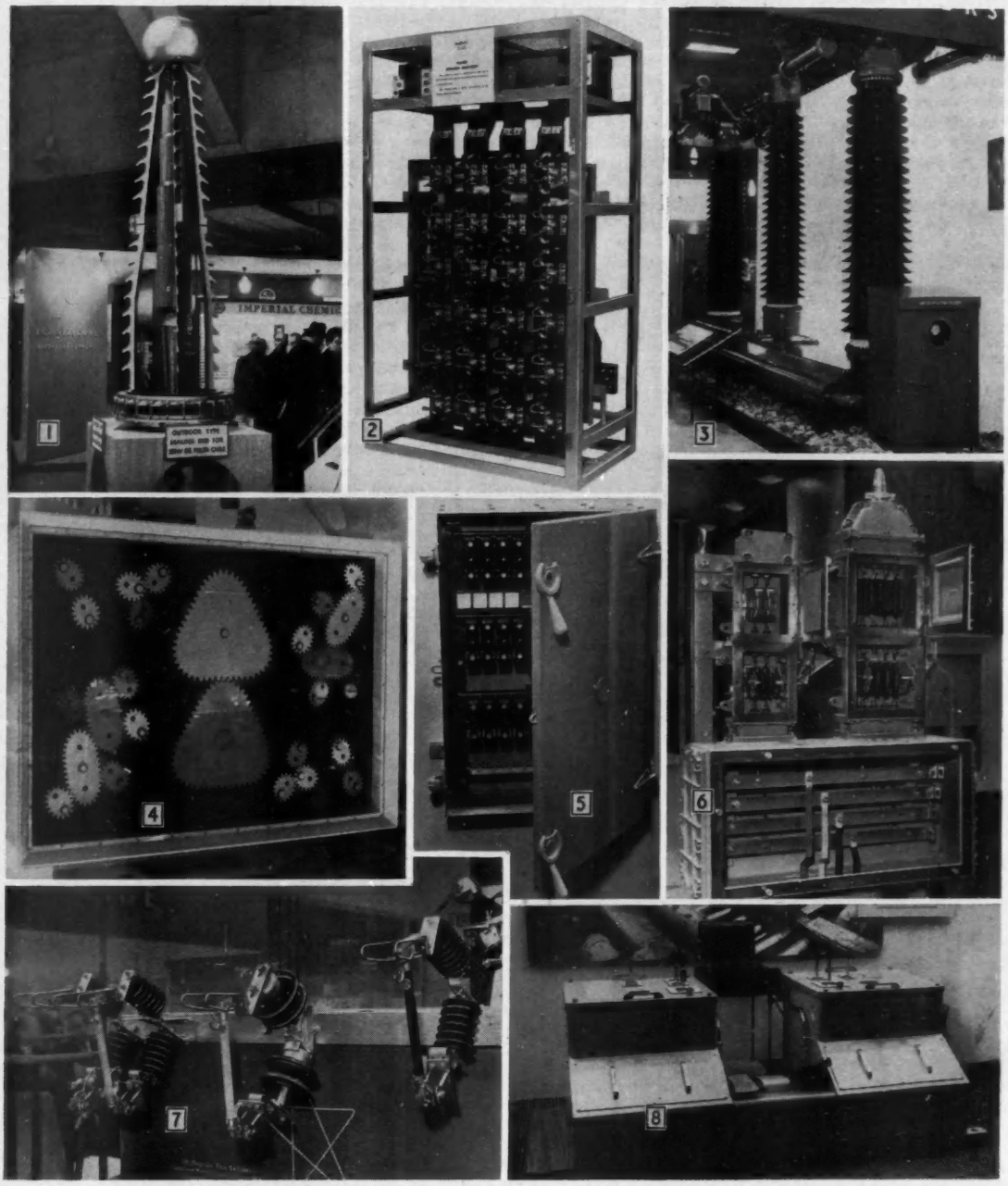
Shown for the first time by Long & Crawford, Ltd., was a new outdoor oil circuit-breaker. With the basic unit fitted with one of the new range of "D" circuit-breakers, it can handle 250 MVA at 11 and 6·6 kV. To maintain a satisfactory impulse level for prolonged outdoor use, the gear is wholly oil-filled except for the

busbar chambers. Among the medium-voltage distribution switchgear, Bertram Thomas showed a 440 V, six-panel double-tier metalclad switchboard with ten outgoing feeder type AM circuit-breakers rated at 25 MVA and an incoming 3,000 A busbar isolator. The basic feature of the l.v. circuit-breaker shown by Erskine, Heap & Co., Ltd., was the patented "direct blast" arc control device.

New metalclad air-break switches in their "HH" range were shown by A. Reyrolle & Co., Ltd. The arc chutes are made of transparent moulded "Diakon" and the switches are capable of making and breaking current surges of up to 1,200 A at power factors as low as 0·3 with voltages up to 550.

An addition to the range of "Chester" switchboards,

1. Pirelli-General oil-filled 330 kV cable sealing end. 2. S.T.C. 2·6 MW silicon rectifier equipment. 3. Single phase of a 330 kV, 10,000 MVA Metropolitan-Vickers air-blast circuit-breaker. 4. Working model of elliptical gear wheels which are used in Fuller on-load tap changer. 5. English Electric Co.'s "Red Spot" industrial fuseboard. 6. Flameproof switch and fuse equipment by Parmiter, Hope & Sugden. 7. Line Equipment fuse cut-outs. 8. Steel mill seated control unit by Allen West & Co.



the "Chester Junior," was exhibited for the first time by Brookhirst Switchgear. With 400 A fuses in the supply to the busbars and the maximum size of fuses for the rating of each unit, the equipment has a through fault capacity of 35 MVA at 440 V. Straight-on starters and distribution gear up to 400 A can be incorporated in the switchboard.

An example of flameproof switchgear was shown by Parmiter, Hope & Sugden, Ltd. These combined switches and fuses have been assembled in unit switchboard form.

Miniature circuit-breakers are being widely used for the protection of circuits and appliances. They ensure maximum continuity of supply, avoid the practice of fitting over-rated fuses in "blown" circuits, give a closer protection than fuses and cut down maintenance costs. Among the manufacturers of miniature circuit-breakers, the M.C.B. Co. (Manchester), Ltd., exhibited their recently introduced "Lupus" breaker. The ratings range from 1·5 to 60 A and up to 440 V a.c. Tests of the new Crabtree miniature circuit-breaker indicate that it is capable of breaking a fault current of 4,000 A at 250 V a.c.

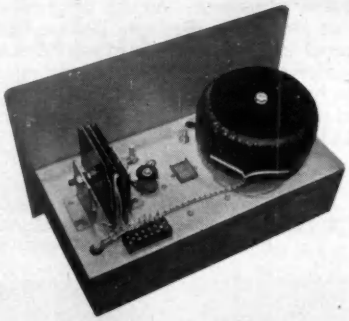
A contactorless switch for single-phase motors up to 2 h.p. was exhibited by Electro-Methods, Ltd. This

Bertram Thomas 440 V distribution switchboard

switch obviates the need for moving parts and the replacement of contacts. The main component of the device is a toroidally-wound choke which can show an impedance of a few ohms to very nearly infinite impedance. A transistor amplifier fed from a signal of less than one microwatt is capable of operating the switch. This type of control may be used for the rapid operation or reversal of small a.c. motors, furnace and oven control, etc.

A range of "Red Spot" heavy duty fuseboards was shown for the first time by the English Electric Co. To prevent dust and other atmospheric impurities from gaining access to the fuse contacts in the fuseboard, the inside of the door is fitted with a gasket and adequate pressure is obtained by a 90 deg movement of the cam type fasteners. The busbars and incoming cable sockets are enclosed in solid insulation.

A combined operator's seat and control unit for a steel plate finishing mill was shown by Allen West & Co., Ltd. This unit gives the operator maximum comfort and visibility together with fingertip control of all the various drives. Master controllers have quick replacement contact systems.



Electro-Methods contactorless switch

Since 132/275 kV auto-transformers are being used on the supergrid system, tap-changing mechanisms have to be fully insulated at 132 kV. Fuller Electric are manufacturing a high-speed resistor tap changer rated at 750 A. One phase of a three-phase unit was shown at the exhibition. Extinction is guaranteed in the first half-cycle. Great attention has been paid to voltage stress in the design by the use of grading shields. Another exhibit of interest shown by Fullers demonstrated the operation of elliptical gear wheels for the drive of selector switches for on-load tap changing.

From their range of transformers, which extends to 20 MVA at 132 kV, the Bryce Electric Construction Co., Ltd., exhibited a 2·5 MVA, 40/6·6 kV, three-phase 50 c/s transformer removed from its tank. Another exhibit on their stand was a demonstration showing the working of an automatic p.f. correction scheme. The equipment enabled various loads to be switched into circuit and meters indicated the current loading on the system before and after each capacitor was brought into circuit.

Line Equipment expulsion fuse cut-outs with standard fuse holders have a fault capacity of 100 MVA, but a special fuse holder exhibited for the first time has a fault capacity exceeding 150 MVA at 11 kV. This fuse holder, which is made of a new material, has the same dimensions as the standard fuse pattern and has standard fuse links. All fuse holders are now fitted with an automatic single- or double-end venting device.

Cables

A sample of a new 25 kV concentric oil-filled cable, which has been designed for the system of single-phase a.c. supply for the British Railways electrification scheme, was shown by W. T. Henley's Telegraph Works Co., Ltd. Some samples of multi-core signalling cable were also shown. Mersey Cable Works, Ltd., had a working exhibit showing a coil of wire insulated with irradiated polythene and another coil insulated with ordinary polythene. When subjected to a current which heated the coils to 140 deg C for three minutes, the ordinary polythene began to melt but the heat had no effect on the irradiated polythene. A cut-away 330 kV oil-filled cable sealing-end was exhibited by Pirelli-General Cable Works, Ltd.

Motors and Control Equipment

The many examples of electric motors which were displayed illustrated the diverse applications which have to be catered for and also demonstrated the fact that continuous and vigorous development work is being undertaken to ensure the satisfaction of the user. The largest rotating machine was shown by Laurence, Scott & Electromotors, Ltd., and this was outside the main entrance to the exhibition hall on account of its weight

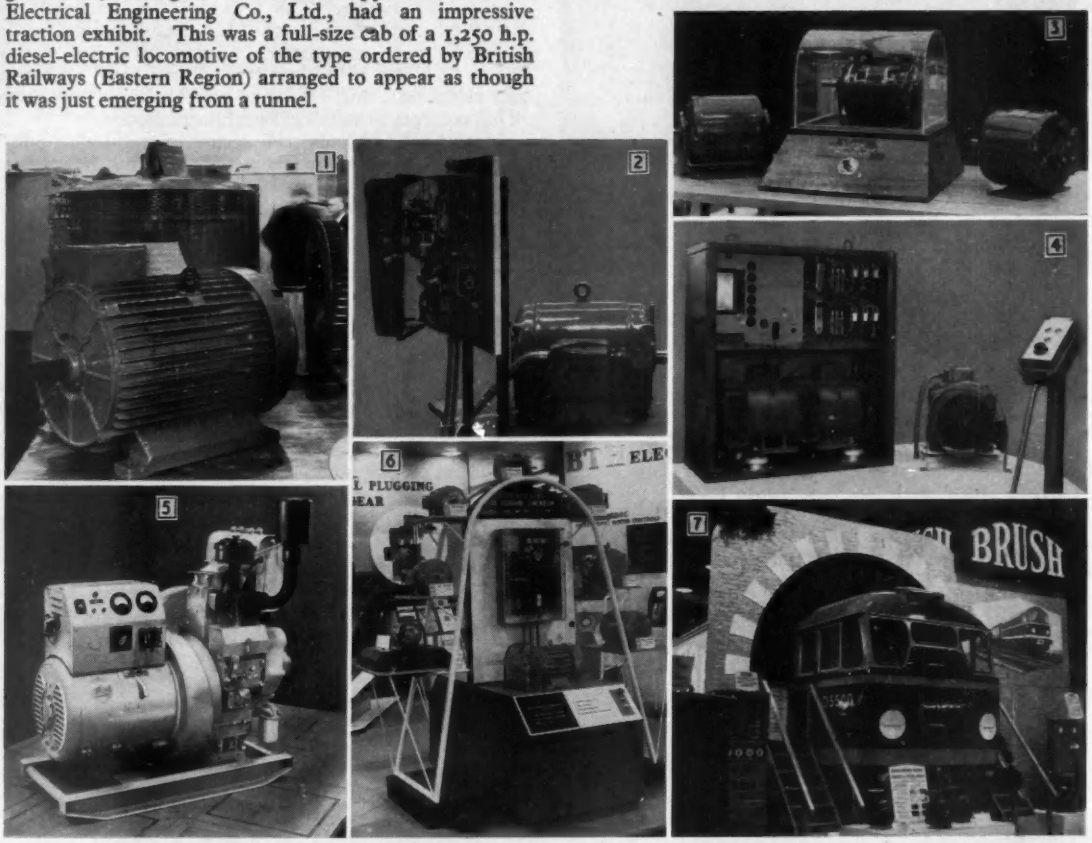
and size. It was a weatherproof N-S variable-speed a.c. motor rated at 860/57 b.h.p., 790/316 r.p.m. and equipped with an air/air heat exchanger. A number of these machines are being supplied to the Central Electricity Generating Board for installation in Willington "A" generating station to drive the induced draught fans associated with the four 100 MW turbo-alternator/boiler units. Large motors were also shown by the Electric Construction Co., Ltd. They had a two-speed 175/81 h.p., 985/735 r.p.m., 2,750 V squirrel-cage machine and a 550 h.p., 330/325 r.p.m., 3·3 kV motor as well as a new electronic contactor control equipment for a triple Ward-Leonard set arranged for speed control of motors within ±0·5 per cent. The electronic units consist of three-speed regulators and one master reference unit.

The new "Transidyne" equipment shown by Lancashire Dynamo Electronic Products, Ltd., is believed to be the first commercial application of transistors in the direct control of electrical machines. This Ward-Leonard variable-speed drive equipment is available in packaged form using printed circuits and with ratings between 1 and 10 h.p. Equipment can be provided for forward, or forward and reverse operation and the standard equipment incorporates IR drop compensation circuits giving ±1 per cent speed regulation from full load to no load and ±2 per cent for ±7 per cent supply variations.

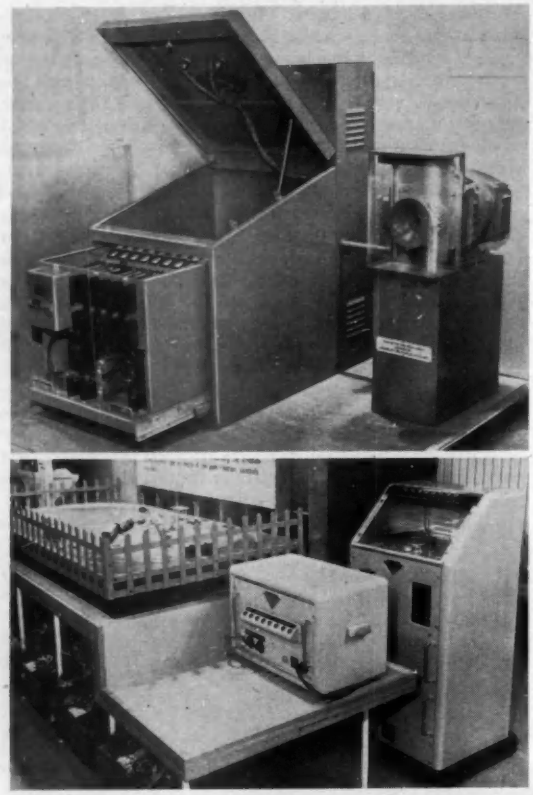
Apart from a wide range of industrial motors and generators, switchgear and electronic apparatus the Brush Electrical Engineering Co., Ltd., had an impressive traction exhibit. This was a full-size cab of a 1,250 h.p. diesel-electric locomotive of the type ordered by British Railways (Eastern Region) arranged to appear as though it was just emerging from a tunnel.

Several firms displayed Class "E" insulated motors. For instance, the General Electric Co., Ltd., had a new range of ventilated machines of this type with outputs of up to 50 h.p. at 3,000 r.p.m. which comply fully with the dimensions given in B.S. 2960. As a result of the higher temperature rise (65 deg C above an ambient of 40 deg C) which is permitted with Class "E" insulation, coupled with careful design to improve efficiency, it has been possible to reduce considerably the sizes and weights of ventilated motors as compared with earlier designs using Class "A" insulation. The British Thomson-Houston Co., Ltd., showed a representative selection of its type KNC Class "E" insulated machines built to draft B.S. dimensions for ventilated motors. It also demonstrated a new method of capacitor d.c. injection braking applied to a three-phase squirrel-cage motor. The new series "T" range of fractional h.p. motors was exhibited by Crompton Parkinson, Ltd. These motors are more streamlined and compact than previous models and incorporate several improvements in design. The single-phase capacitor-start-induction-run motor introduced a few weeks ago was shown by Newman Industries, Ltd. This motor is aimed chiefly at agricultural applications to meet the demand for a reliable motor for use in rural areas where supplies are generally single-phase only.

The new E.S. range of alternators demonstrated by Arthur Lyon & Co., Ltd., are self-exciting, self-regulating



1. E.C.C. two-speed s.c. motor, 175/81 h.p., 2,750 V, 985/735 r.p.m., with 550 h.p., 3·3 kV, 330/325 r.p.m. s.c. motor in background. 2. G.E.C. Class "E" insulated motor. 3. Crompton Parkinson f.h.p. motors. 4. Lancashire Dynamo transistorised Ward-Leonard control drive. 5. Arthur Lyon type ES 3·25 kVA alternator with Ruston drive. 6. B.T.H. Class "E" insulated motors and three-phase s.c. motor with capacitor d.c. injection braking. 7. Cab for 1,250 h.p. Brush diesel-electric locomotive for British Railways



Top : Igranic magnetic amplifier motor control. Bottom : Heenan & Froude programme controller

and intended for unity p.f. applications where the voltage regulation requirements are not stringent. An interesting feature is the provision of additional windings for 24 V engine starting and battery charging. At present single-phase machines are being made with ratings of 3 to 11 kVA, 50 c/s, 1,500 r.p.m. and 3 to 12·5 kVA, 60 c/s at 1,800 r.p.m.

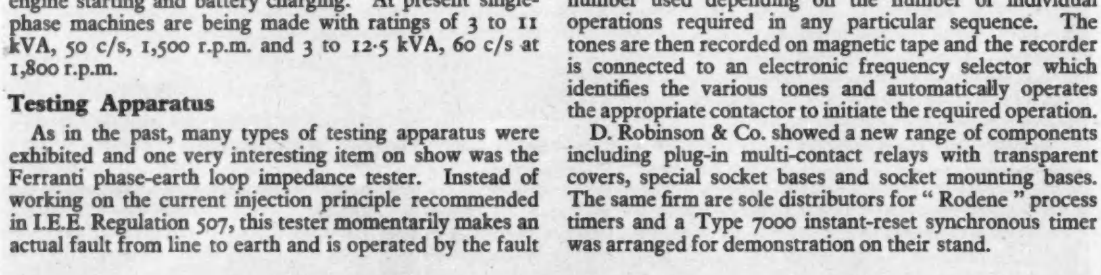
Testing Apparatus

As in the past, many types of testing apparatus were exhibited and one very interesting item on show was the Ferranti phase-earth loop impedance tester. Instead of working on the current injection principle recommended in I.E.E. Regulation 507, this tester momentarily makes an actual fault from line to earth and is operated by the fault current, a method considered to be far superior to any low-voltage test. In similar vein Partridge Wilson & Co., Ltd., had its "Davenset" earth core tester for testing the flexible cables on portable tools up to size 110/·0076. It is very simple to operate and works from standard 200/250 V a.c. mains. The same company also had a constant voltage rectifier for electroplating. The plating voltage may be pre-set to any value between 8 and 16 V and will remain constant irrespective of variation in plating current from zero to 250 A. This avoids burning and uneven plating. Standard Telephones & Cables, Ltd., showed a silicon rectifier cubicle from a 130 V, 20,000 A d.c. power plant used in the electrochemical extraction of metals from ores.

An interesting electronic counter was demonstrated by the Revo Electric Co., Ltd., which has as its principal feature an "in line read out." The count is displayed as one row of numbers ¾in high and is readable under normal light conditions at distances up to 25ft. The maximum counting speed is 10 kc/s and the instrument accepts positive or negative pulses of over 500 mV peak. A transistor batch device with a maximum counting rate of 1,000 per sec that can batch at 300 per min was shown by Smiths Industrial Instruments, Ltd., while P.A.M., Ltd., demonstrated a battery-operated portable transistorised counter designed for counting small production quantities at a maximum rate of 4 per sec. This is thought to be the only battery-operated counter of its type on the market. The "Vacuo" junction made by Best Products, Ltd., is designed for measuring small audio and radio frequency currents. Because it is little larger than a flashlamp bulb it can be built into small ammeters and voltmeters, thus rendering possible direct indication of h.f. currents by standard switchboard meters.

In the field of industrial control the "Heenatone" programme control unit demonstrated by Heenan & Froude, Ltd., in conjunction with a Hornby "Dublo" model railway enables any number of operations to be planned in any required sequence and then carries them out automatically. The equipment incorporates an electronic frequency indicator which produces tones of various frequencies. The tones are selected by push-buttons, the number used depending on the number of individual operations required in any particular sequence. The tones are then recorded on magnetic tape and the recorder is connected to an electronic frequency selector which identifies the various tones and automatically operates the appropriate contactor to initiate the required operation.

D. Robinson & Co. showed a new range of components including plug-in multi-contact relays with transparent covers, special socket bases and socket mounting bases. The same firm are sole distributors for "Rodene" process timers and a Type 7000 instant-reset synchronous timer was arranged for demonstration on their stand.



Left : Revo electronic counter. Centre : Rodene Type 7000 process timer from D. Robinson & Co. Right : Davenset earth-core tester

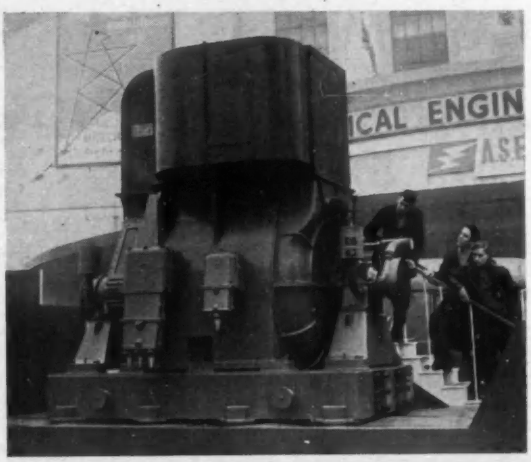
An interesting exhibit was a magnetic amplifier which simulates a Ward-Leonard drive without the use of an a.c. motor and a d.c. generator. The system, shown by the Igranic Electric Co., Ltd., was used to control a 5 h.p. motor and utilised feedback to give stable speed operation to an accuracy of ±2 per cent.

A system of wall-to-wall lighting, the "Sylvalume," combining the functions of highly efficient illumination and a decorative false ceiling, was shown by Atlas Lighting, Ltd. With this system the number and position of the 8ft tubes can be adjusted to achieve any desired light level. Vinyl plastic diffusers of differing textures and forms are suspended on an aluminium grid from the trunking. Decorative acoustic baffles can be clipped in various formations to the grid.

On the Benjamin golden stand, which celebrates the company's jubilee, a new mushroom fitting giving a wide spread diffused light was shown.

On their stand, Simplex Electric Co., Ltd., commemorated their 60th year of conduit manufacture with a special conduit display. They also showed for the first time an off-peak floor warming equipment known as the "Merplex" system. Electric floor warming was also demonstrated by Panelec (Great Britain), Ltd. The Tyrad directly-embedded system of electric floor heating is designed for simple and speedy installation at very low capital cost. The system comprises a range of heating elements together with an inexpensive expendable pattern former for use in laying out the elements and holding them fast during screeding.

Many other interesting exhibits were to be seen at Earls Court. To mention but a few, there was the "Samica" mica-paper insulation of the Micanite & Insulators Co., Ltd., the flameproof and weatherproof cable junction box of Hawke Cable Glands, Ltd., the Kelvin Hughes shadowless operating theatre lighting fitting, the Dimplex 4 kW industrial infra-red heaters and Veritys "Alux" method of surface treatment for aluminium which enables it to be used as a light reflector.



Large Laurence, Scott motor outside Earls Court entrance

British Refrigeration Association

ANNUAL LUNCHEON

MR. D. S. CARRUTHERS, chairman of the British Refrigeration Association, presided at the Association's annual luncheon at the Connaught Rooms, London, W.C.2, on Friday last week. In introducing the principal guest, Lord Mills, Minister of Power, Mr. Carruthers said that his first chairmanship was that of a company interested in refrigeration—W. & T. Avery, Ltd.

Lord Mills, who proposed the toast of the Association, said that the warmth of the members' welcome contrasted with the chill of their normal occupation. Since the end of the last century the refrigeration industry had covered the world with refrigerated warehouses, ships and transport containers and had made possible the shipping of foodstuffs over vast distances. Speaking of his responsibility for fuel and power Lord Mills said that heat and refrigeration were being linked by the transportation of frozen methane gas from the Western Hemisphere to this country.

The large export trade which the industry had built up was a tribute to its workmanship and salesmanship. Although some of their customer-countries were starting up their own refrigeration industries, his experience was that in the long run this actually meant more business. He was sure that the industry would adapt itself to changes in its markets.

At home the industry, with others, was adversely affected by purchase tax. No doubt they would like to hear from him that the tax was to be eased, but that was a matter for the Chancellor of the Exchequer, who had been left in no doubt of the Association's feelings on the subject. Credit restrictions were a good medicine which had a nasty taste, but they had been essential to recovery and were having effect.

Replying to the toast, Mr. Carruthers spoke of the dependence of the refrigeration industry upon electricity. Domestic refrigerators, and in some cases small commercial types, had been seriously affected by the restriction of credit terms and the 60 per cent purchase tax. They did not understand why, because refrigeration was the biggest step forward in food preservation. We had to choose between restriction and control, or taking risks to improve production, and he favoured the latter. Mr. Carruthers quoted a case in which an assembly line designed for 200 refrigerators a day had been able to produce 700 with a little adjustment and the unit cost had been reduced by 17½ per cent. Some great refrigerator factories were just turning over; if they were able to go ahead costs would be considerably reduced. The refrigeration industry was exporting 40 per cent of its production; this was too heavy a burden to sustain in present circumstances and he was doubtful whether they could continue to bear it. They had to quote very competitive prices and profits were too low to enable them to spend sufficient on new plant and machinery. Through Lord Mills he appealed to the Government to give them greater encouragement and so enable them to plan for improved productivity.

B.E.A.M.A. ANNUAL MEETING

THE forty-seventh annual general meeting of the British Electrical and Allied Manufacturers' Association was held at the Connaught Rooms, London, on 27th March. In presenting the annual report, which was summarised in our last issue, Mr. J. O. Knowles, chairman of the B.E.A.M.A. Council, said that almost any day of the year there were several meetings of B.E.A.M.A. committees, either specialist, sectional or technical. Much of the value of these meetings lay in the cut and thrust of friendly argument by which the members, each an authority in his own firm, learned from each other during discussions of subjects which bore directly on their own individual responsibilities. He paid tribute to the ability of those who served on B.E.A.M.A. committees and to the breadth of view which inspired them to seek solutions acceptable to all without either disguising their personal opinions or trying to snatch an unfair advantage.

Referring to the electrical industry's record exports in 1957 of £279·2 million, and to the growth of competition, Mr. Knowles said that they needed freedom of action to display all the vigour, inventiveness and good administration which were characteristics of the industry. He also asked how they could plan their mass production and exports on the basis of a home market subject to uncertain and unpredictable Government action on purchase tax and hire-purchase. A further handicap to trade, at home and with the Continent, was the difference between industrial legislation in Britain and on the Continent. "We must not judge our own practices," Mr. Knowles stressed, "or have the national interest judged on past conditions when we have moved on into new conditions of trade."

The true and proper basis for a European Free Trade Area would be in an awareness of common interests in Britain and Europe. Political action might therefore precede and define the course of industrial action, but British politicians were working on the assumption that British industry could on balance secure a fair share of the expected expansion in European trade. While it was essential, Mr. Knowles continued, to study the advances in technique made by other industrial nations, "we need not have too modest an opinion of our own capacity and attainments."

Mr. Knowles expressed the Council's gratitude to the 130 B.E.A.M.A. firms who had shared in the cost of the collective exhibit at Brussels, but said that they were still some £20,000 short. He therefore appealed for a contribution from those 80-odd firms that had taken space in the *BEAMA Catalogue* but had not supported the industry's display at Brussels.

After referring to the discussions on a national approvals scheme and to the significance of standards in relation to exports, Mr. Knowles commended to member-firms the importance of encouraging staff to participate in the work of the I.E.C. so that the British point of view was adequately represented. In conclusion, Mr. Knowles expressed his appreciation of the work done by, and the help he had received from, the permanent staff of the association.

Sir Vincent de Ferranti, president of the B.E.A.M.A.; Mr. J. O. Knowles, chairman of Council; and Mr. W. K. G. Allen, vice-chairman

At the Council meeting following the annual general meeting Mr. J. O. Knowles (Brookhirst Switchgear, Ltd., and Metal Industries, Ltd.) was re-elected chairman of Council for the year 1958-59 and Mr. W. K. Allen (W. H. Allen, Sons & Co., Ltd.) was re-elected vice-chairman. Sir Vincent de Ferranti also continues as president.

Atomic Clocks

AN informal lecture on atomic clocks was delivered on 25th March by Dr. L. Essen before the Measurement and Control Section of the Institution of Electrical Engineers.

Dr. Essen said that the linking of frequency standards with atomic vibrations was associated with the detection of spectral lines by microwave radio techniques. A problem arose out of the very low energy of the lines—about 10^{-5} of those in the optical spectrum.

In the atomic-beam magnetic-resonance method a narrow beam of atoms travelled about 1 m through a system of steady and alternating magnetic fields, which caused deflections depending on the energy levels of the atoms. When the alternating field had a frequency corresponding to the spectral line, the deflections were reversed and the atoms were focused on to a detector, reaching a maximum when exciting and line frequencies were equal, and enabling a laboratory oscillator to be set precisely at a frequency which was a fundamental atomic constant.

A standard of this kind using the caesium atom and a spectral line at near 9,200 Mc/s to which all quartz clocks there had been calibrated since 1955 had been designed and built at the National Physical Laboratory. Accidental variations of the parameters should not cause frequency changes exceeding a few parts in 10^{11}.

An alternative frequency standard, the Maser, was derived from the inversion spectrum of the ammonia molecule. In this the low-energy molecules were deflected out of a beam of ammonia, leaving the high-energy molecules to enter a cavity resonator where they fell back into the low-energy state, liberating enough energy to maintain oscillations at the line frequency in the cavity coupled to a klystron. The frequency, near 23,870 Mc/s, was not quite so convenient as that of the caesium standard and was more dependent on external conditions. Atomic standards already enabled a unit of time to be established with greater convenience and accuracy than astronomical measurements.

PARLIAMENTARY REPORT

Atomic Power Generation

Questions about the future development of atomic power stations were put to the Parliamentary Secretary of the Ministry of Power in an adjournment debate. Replying, Sir Ian Horobin said that Mr. Mason in his references to the possible direct conversion to electricity from "ZETA" was looking a very long way ahead. "In theory, the plasma could be used directly for conversion, but that is a long way ahead and I do not think that at the moment it is a practical consideration," he said. On the question of links with industry, he said that the relations between the Authority and private industry showed that they had found a happier and more practical arrangement for a partnership than in other countries.

Considerable progress was being made with air-cooling in conventional stations; there were economic difficulties, but it was thought that there might be sufficient set-off in the saving of fuel transport costs by being able to put the stations nearer to coal, whereas it might not be possible in the ordinary way because there was not sufficient water. "With atomic stations the amount of water involved is enormously greater, therefore the chances of it being an economic proposition are extremely slight. But at any rate, progress in the actual design and the development of such cooling methods is well advanced and if it can be proved satisfactory in a conventional station, then conceivably at some future date it might be worth consideration in atomic stations."

He thought that statements about new developments were best left to the Authority, and called attention to the significant news contained in their annual report every year.

Restrictive Agreements

In answer to Mr. Leavey, Mr. F. J. Erroll said that the Board of Trade had now called up for registration all the restrictive agreements covered by the Act. Directions had been issued to the Registrar to bring before the Court about 200 registered agreements; another direction would be issued shortly.

Mr. Wade referred to the growth of amalgamations.

Mr. Erroll said it would not be practicable to refer such amalgamations to the Monopolies Commission if they did not constitute monopolies within the terms of the Act.

Price Maintenance

Mr. George Darling asked the President of the Board of Trade whether he would re-examine the provisions for enforcing individual retail price maintenance in the Restrictive Trade Practices Act, 1956, as recommended by Lord Cohen's Council on Prices, Productivity and Incomes.

Sir David Eccles declined to do so, saying that it was too soon after the passing of the Act to reopen this question.

Hire-Purchase and Credit Sales

Mr. John Rodgers asked the President of the Board of Trade what percentage of the increased hire-purchase and credit sales in the year 1957 was attributable to the sales through the retail shops of the Gas and Electricity Boards.

Sir David Eccles gave the figure as about 3 per cent.

Mr. Rodgers also asked for the total hire-purchase and credit sales by the Boards.

Sir David Eccles replied that for 1956 and 1957, respectively, the amounts were: Gas Boards, £15 and £17 million; Electricity Boards, £15 and £19 million.

Gas and Electricity Showrooms

In reply to a question by Lieut.-Col. Bromley-Davenport, regarding expenditure by the Gas and Electricity Boards on modernising their showrooms, Sir Ian Horobin said: "The amount allowed for these purposes is controlled by the Minister and it has been reduced. But these Boards must be considered as commercial undertakings. We would get on better if they were more commercial, not less. It is surely to no one's advantage that they should have bad showrooms, therefore any general direction to prevent them modernising would not in the long run be to the advantage of anyone."

Fuel Policy

Mr. Palmer asked if, in view of the abundance of small coal, the Government would sponsor a national energy policy designed to ensure the maximum utilisation of indigenous fuel resources.

Sir Ian Horobin said it was the Minister's policy to make the maximum use of indigenous resources of fuel provided this could be done economically and in conditions of fair competition between fuels, whether native or imported. The present abundance of small coal arose in part from circumstances of a temporary nature and in part from some unbalance between production and demand of the different sizes of coal.

Mr. Nabarro said that if it was the Government's policy to encourage the use of indigenous fuels, why did the Treasury tax by 60 per cent gas and electricity space and water heaters, whereas the equivalent oil appliances using imported fuel bore no tax at all?

Sir Ian Horobin said that should be put to the Chancellor of the Exchequer, and Mr. Nabarro would know what the answer would be at this time of the year. (Budget Day is 15th April.)

Tax on Heating Appliances

The taxing of gas and electric space and water heating appliances, while exempting the equivalent oil appliances, was again strongly criticised in an adjournment debate opened by Mr. Nabarro. Calling on the Government to remove the discrimination, he said he agreed with the statement recently made by Sir Harold Smith, chairman of the Gas Council, that this purchase tax was far more suited to a Gilbert and Sullivan opera than to any business or commercial undertaking.

Under the Clean Air Act, it would be necessary to install large numbers of smokeless appliances in smoke control areas and, according to the terms of the Act, up to 70 per cent of the cost of these appliances could be paid by the local authority under subvention from the Treasury in the form of Exchequer aid. "What happens, therefore, to a limited extent at present but in hundreds of thousands of cases next year—probably a million cases in the next few years—is that the local authority will pay up to 70 per cent of the cost of a gas or electrical heating appliance to the wholesaler who supplies it," he said. "That cost will include 60 per cent purchase tax. The wholesaler will collect the tax, remitting it to the Customs and Excise. This will find its way back to the Treasury. But the Treasury will be paying the local authority 70 per cent of the cost. . . . Thus the circumference is exactly complete. The money which the Treasury pays out of one pocket finds its way by a circuitous route back to the Treasury's other pocket."

The Germans were a long way ahead of us in the export of domestic appliances—notably electrical appliances. The cost of these depended largely on output. The Germans did not artificially depress their home market. They put a 4 per cent turnover tax on electrical appliances. We put a 60 per cent tax on them.

The export value of British electric water heaters in 1955 was £490,000, while in 1956 it was £382,000. The figures were not available for last year, but he understood that they had declined further. Compared with this, in 1955 German exports were valued at £1,900,000 and in 1956 the figure had risen to £2,300,000, or more than six times as much as British exports. The electricity load factor in this country was only about 45 per cent, which was lower than in Western Germany or the United States. This was in measure due to the lack of diversification of the load. Yet we were deliberately depressing a

domestic demand, which was largely an off-peak demand, by a stultifying 60 per cent tax. The Coal Board had millions of tons of small coal lying around the country. There was only one place where it could be used effectively—in power stations. It was stupid to encourage the use of imported oil when such vast indigenous resources were available.

Mr. David Price tried to divine the Treasury's reason for putting a tax on gas and electric heaters, when oil appliances escaped. Technically there are no grounds for it at all, he said, yet the disparity existed.

Mr. Ray Mawby said that since the load factor was less than 50 per cent it meant that there was a great waste of capital. There should be more education to make certain that space heating was done by electricity, on the thermostatic principle, so that most of the domestic demands were off-peak.

Mr. J. E. S. Simon, Financial Secretary to the Treasury, said that if one discussed the merit of any tax, it was to a great extent anticipating the discussion of it that the Chancellor was bound to inaugurate in his Budget statement. The Chancellor would take note of what had been said.

Tax on C.R. Tubes

Mr. Arthur Lewis asked the Chancellor of the Exchequer on what date he received a communication from the British Radio Valve Manufacturers' Association concerning purchase tax on television cathode ray tubes.

Mr. Heathcoat Amory said the Association wrote on 27th January and an undertaking to bring their representations to his attention was sent from his office, in reply, on 29th January.

Registered Designs Bill

The Registered Designs Act 1949 (Amendment) Bill, promoted by Mr. Alan Green, to give greater protection against the infringement of designs in the period between application for registration, and registration, received a second reading. It now goes to a Standing Committee for detailed consideration.

Loans Bill Receives Royal Assent

The Nationalised Industries Loans Bill, which extends the borrowing powers of certain nationalised industries including the electricity supply industry until 31st August, 1958, last week received the Royal Assent in the House of Lords.

ELECTRICAL INDUSTRIES CLUB

The annual meeting of the Electrical Industries Club is to be held at the Connaught Rooms, London, W.C.2, on 15th April (12 noon), and at the following monthly luncheon the guest speaker will be Sir Christopher Hinton, chairman of the Central Electricity Generating Board.

Airport Lighting

THE General Electric Co., Ltd., has been awarded the contract by the Government of Hong Kong for the supply and installation of the complete operational lighting system for the new £7 million Kai Tak Airport now being built at Hong Kong. The contract is valued at HK$2,621,655 (about £164,000), and the installation work will be carried out by the British General Electric Co., Ltd., Hong Kong, as sub-contractors. The civil engineering consultants for the complete airport scheme are Scott & Wilson, Kirkpatrick & Partners, London, and the electrical consultants for the lighting scheme are Preece, Cardew & Rider, of London.

The contract will involve the supply and installation of high and low intensity runway and approach lighting, taxiway lighting, a location beacon, obstruction lighting, navigational warning lights, and auxiliary terminal apron lighting. In addition to the lighting equipment, the G.E.C. will supply and install all the main and control underground cabling, airfield lighting switchboards, stand-by diesel sets, incoming supply switchgear and transformers, and a remote control console. Two unusual features of the contract are that the substation at the seaward end of the runway, which extends into Kowloon Harbour on reclaimed land, will be built underground, and that, because of the height of the adjacent Lion Rock hills, the north-west approach to the new airport will be curved over a closely built-up area of Kowloon City. This approach will be equipped with a centre line and bar lighting system comprising high and low intensity lights mounted on structures situated in Kowloon City. The approach from the south-east will be equipped with a centre line system of high and low intensity lighting mounted on structures rising from the waters of Kowloon Harbour.

Embakasi Installation

All the runway and airfield lighting for the new Nairobi airport at Embakasi, opened by the Governor of Kenya, Sir Evelyn Baring, last month, has been supplied by the General Electric Co., Ltd. In addition, the G.E.C. is providing the entire electrical equipment for the new East African Airways Corporation base at Embakasi. This contract, worth £34,000, includes lighting of buildings, all switchgear and wiring in workshops and hangars, and all catering equipment.

Runway lighting at Embakasi consists of ninety low-intensity elevated omni-directional lights at 200ft intervals. Each light is ten inches high, mounted on a tubular stem which can fracture in collision without damaging aircraft. This is the first time this type of runway light has been used in East Africa. The last twenty lights at each end of the runway show amber in the landing direction and white in the reverse direction.

Threshold lighting is by ten low-intensity lights at each end of the runway, at 9ft intervals, and fitted with green colour filters. Stopway areas behind the threshold lights are demarcated by twelve runway lights with red filters facing aircraft taking off. Taxiways have 262 runway-type lights with blue filters, arranged in pairs on opposite sides of the taxiways at 162ft spacing on the straight and 39ft spacing on the curves.

Approach lighting is a half-Calvert system on the normal S.W. approach, and a coded centre line on the N.E. approach, consisting of 800ft of single lights and 600ft of double lights at 200ft spacing. A total of seventy-eight low-intensity fittings are used, mounted on frangible poles. Eight 1 kW floodlights illuminate the apron, and roadways are lit by ten enclosed cut-off lanterns. In addition the G.E.C. has supplied a number of single and double obstruction lights on high points, a location beacon giving four flashes per revolution two miles north-west of the airport, an illuminated T landing direction indicator, and an illuminated wind cone.

Electronic Computer Exhibition

The Duke of Edinburgh has consented to be patron of the Electronic Computer Exhibition and Business Symposium to be held at Olympia, London, from 28th November to 4th December next. More than forty British manufacturers of electronic computers and ancillary equipment are taking space in the exhibition which will be the first of its kind in the world. The symposium will stress the value of the computer as an aid to management and will consist of papers designed to bring to the business executive up-to-date information arising from the latest practical experience of the installation and operation of British computers and data processing systems. The exhibition and symposium are being organised at the suggestion of the National Research Development Corporation by the Electronic Engineering Association and the Office Appliance and Business Equipment Trades Association. Immediately preceding the exhibition and business symposium there is to be an associated scientific symposium organised by the National Physical Laboratory and to be held at Teddington from 24th to 27th November. Admission is by invitation. Further information about the exhibition and business symposium is obtainable from the Exhibition Organiser, 11-13, Dowgate Hill, London, E.C.4.

GENERATION AND DEVELOPMENT

Higher Consumption in Cold Spell

The latest output statement of the Ministry of Power, covering the week ended 21st March, strikingly confirms the considerable influence which the weather has on electricity consumption. In that period—part of the recent cold spell—2,009 million kWh was sent out for public supply from steam stations. This was 425 million kWh more than in the corresponding week last year, an increase of nearly 27 per cent.

Farm Supplies in North Scotland

A "very fine achievement" is how the Association for the Preservation of Rural Scotland in its annual report describes the progress of the North of Scotland Hydro-Electric Board in supplying electricity to farms and crofts. In April, 1948, 550 crofts (one in 100) and 1,400 farms (one in 14) had electricity. By the end of last year there were 21,800 crofts and 11,854 farms connected, representing, respectively, 60 and 62 per cent of the potential total. Electricity sold to farms in 1957 totalled 96·9 million kWh, as against 14·9 million in 1949.

Improved Supply to Falmouth Docks

A major construction project costing about £148,000, for reinforcing and improving power supplies to Falmouth Docks, where facilities are being provided for the world's largest oil tankers, is approaching completion. At the same time the existing high voltage network in Falmouth town itself is being strengthened. The work involves the construction by the South Western Electricity Board of a new substation on Dock property. An interesting feature is the use of electrical floor heating in the substation building. This has been found to be so satisfactory that it is now being adopted as a standard installation in all the Board's major high voltage substations in Cornwall.

Consent Refused

It is reported that objections by Kent County Council and Whitstable Urban Council to a proposal by the South Eastern Electricity Board to erect overhead lines at Downs Avenue, Whitstable, have been upheld by the Minister of Power.

Prefabricated Stations for Electrified Lines

To keep pace with main line electrification work, a new kind of prefabricated station building has been developed by British Railways (London Midland Region). Outstanding features are good appearance, permanence and very easy maintenance. Little or no re-painting will be necessary. As a first step the structures are to be used in the modernisation of eleven stations between Crewe and Manchester and seven stations between Crewe and Liverpool.

The new buildings are made from standardised components of steel, aluminium, wood, plastic and special compositions, produced in factories and assembled by numbers on site.

Supply to Island

The Rural Electrification Branch of the Electricity Supply Board, Dublin, recently completed the laying of submarine cables between the mainland of Co. Cork and Bere Island. Nearly all the householders and shopkeepers on the island have applied for a supply.

Water Heating Installations

Whitstable Urban District Council has approved the provision of electric water heating in 140 pre-war Council properties.

Southend Train Indicator

The first production model of a new train departure indicator, electrically operated, is now in use at Southend Victoria Station, the equipment being supplied by Siemens Edison Swan, Ltd., to the order of British Railways Eastern Region. This design of indicator was demonstrated at Fenchurch Street last summer.

The indicator board is 14ft high by 8ft wide and comprises four panels, each showing the time of departure of the next train and the stations at which it is scheduled to call. Up to twenty stopping places can be indicated on each panel. Apart from stations on the direct route to Liverpool Street, provision has been made for the display of a wide variety of special excursion trains.

Station staff have only to set up, on clearly marked rotary switches, four digits for the time of departure and a three-figure code representing the stations being served. The depression of a "Make Display" button will then initiate the correct display. In the event of disruption of services by fog, breakdown and the like, further information about additional stopping places may be added at the last moment. The indicators are of the company's new self-motorised six-faced type. The whole equipment is controlled from a panel in the inspector's office.

Electrically operated departure indicator at Southend

OVERSEAS

Sixth Set for Kariba

The *Financial Times* reports that the Federal Power Board of Rhodesia has been authorised to purchase a sixth 100 MW set for the Kariba hydro-electric project. Sir Malcolm Barrow, Minister of Power, who announced this, said that the order would be placed immediately and the set should be in operation by 1962. According to forecasts of demand, the sixth set would not be absolutely essential until about 1965, but its installation in 1962 would enable a substantial quantity of high-cost generation at the coalfield stations to be replaced by low-cost hydro-generation. It was estimated that these savings would be sufficient to pay for the whole cost of the set in four years of operation.

Orders for the five turbines and generators already placed went to Boving & Co. and Metropolitan-Vickers, respectively.

Uganda Output Doubled

Electricity generation for sale in Uganda during January amounted to 15·4 million kWh, compared with 11·1 million in the same month last year, an increase of 38·9 per cent. January, however, marked the start of the bulk supply to Kenya, and in addition to the above figures 6·8 million kWh was exported to the neighbouring territory.

In February 14·8 million kWh was generated for Uganda and 6·4 million kWh exported, making a total for the two months of 43·4 million kWh, an increase of 99·2 per cent.

DOMESTIC ELECTRICAL EQUIPMENT

Cleaners and Polishers

IN the following survey we give particulars of two items of domestic electrical equipment which are high in the list of eliminators of home drudgery: vacuum cleaners and floor polishers.

Basically, there are two types of vacuum cleaner, the cylinder model with internal dust bag and the upright cleaner with external bag. It is largely a matter of personal choice which model is preferred, but for the average house, where it is continually necessary to deal with staircases, walls, furniture, etc., the cylinder cleaner with its greater manœuvrability and additional accessories will probably be favoured. Where there may be a considerable expanse of carpeting, however, it is the upright model which is perhaps more suitable.

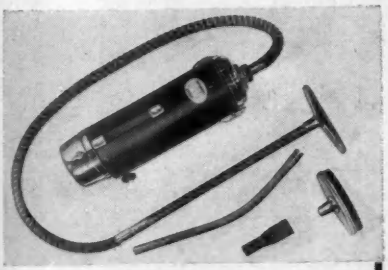
Mention may also be made of the spherical cleaner (see Hoover, Ltd., and Morphy-Richards, Ltd.) which can be placed in a central position in a room whilst cleaning is carried out in the farthest corners. Hand types, of which there are a number of makes available, are intended for cleaning in places where a full-size machine is too heavy or otherwise inconvenient to use. Since our last survey, Vactric, Ltd., have introduced a new cylinder model (W.303) and an upright cleaner (R.58), and the General Electric Co., Ltd., have added to their range a powerful upright model (DM.540) with a consumption of 500 W.

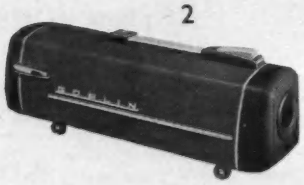
Compared with the vacuum cleaner, the electric floor polisher is a more recent labour-saving device in the home, but its advantages for those who have large areas of floors, not to mention tables and other items of furniture, are now beginning to be appreciated. Running costs are almost negligible, only half that of a vacuum cleaner, but floors can be polished in a tenth of the time taken by hand. Both two- and three-brush types are equally popular and several models can also tackle wet scrubbing and, with the addition of attachments, be adapted for such purposes as sanding, buffing and scouring. The latest Tricity polisher (TP.57) also combines the functions of a vacuum cleaner, can be used for wet scrubbing, and has a headlight to illuminate dark corners.

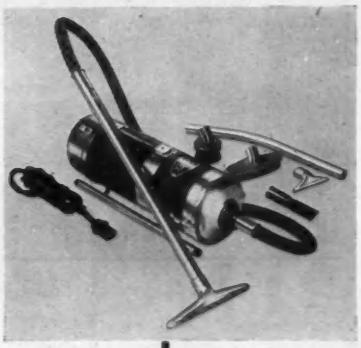
VACUUM CLEANERS

Manufacturer	Name or Model	Type	Motor	Special Features	Accessories	Finish	Price (excl. tax)	Purchase Tax
BRITISH VACUUM CLEANER & ENGINEERING CO., LTD., Goblin Works, Leatherhead, Surrey.	"Regal" G.38	Upright	250 W	Dust finder headlight, beater brush	Full set brushes and nozzles	Fawn enamel, red dust bag	£21 0 0 plus £3 13 6 (accessories)	£9 4 3 plus £0 14 3 (accessories)
	"Cleansweep" G.531	Cylinder	300 W	For the small house	Full set brushes and nozzles	Silver grey, brown ends	£15 19 6	£7 0 2
	"Triumph" G.52	Cylinder	300 W	For the medium sized house	Full set brushes and nozzles	Ivory body, Burgundy end covers	£19 19 0	£8 15 0
	"Ace" G.56	Cylinder	500 W	Powerful motor combined with quietness	Full set brushes and nozzles	Two-tone ivory and Burgundy	£22 11 6	£9 18 1
	"Popular" G.141	Cylinder	300 W	Low cost	Sufficient for most cleaning needs	Almond green body, chromium end covers	£13 2 9	£5·15 3
	"Minor" G.14	Cylinder	300 W	Low cost	Sufficient for house cleaning	Ivory body, almond green end covers	£10 4 4	£4 9 8
BROWN BROTHERS, LTD., Great Eastern Street, London, E.C.2.	"Duco Junior" ECA 34/92 and ECA 34/117	Cylinder	230 W	—	Nozzle, oval brush and crevice tool	Rexine body with matching ends	£8 6 8 (ECA 34/92) £8 13 4 (ECA 34/117) suppressed	£3 12 2 (ECA 34/92) £3 15 1 (ECA 34/117) suppressed
	"Duco Super Silent" ECA 34/91 and ECA 34/116	Cylinder	230 W	Completely shrouded motor	Nozzle, triangular and oval brushes, crevice tool	Rexine body, chromium ends	£11 19 0 (ECA 34/91) £12 7 7 (ECA 34/116) suppressed	£5 3 6 (ECA 34/91) £5 7 4 (ECA 34/116) suppressed
	"Duco Blue-Riband" ECA 34/95 and ECA 34/115	Cylinder	230 W	Swivelled hose, recessed switch	Nozzle, triangular and oval brushes, crevice tool	Rexine body, cast ends	£10 6 5 (ECA 34/95) £10 13 4 (ECA 34/115) suppressed	£4 9 5 (ECA 34/95) £4 12 5 (ECA 34/115) suppressed
	"Duco Major" ECA 34/102 and ECA 34/118	Upright	275 W	Motor driven brush agitator, adjustable nozzle	Nozzle, oval brush, crevice tool, 2ft tube ext. and flexible hose	Maroon body and bag	£12 5 9 (ECA 34/102) plus £3 3 0 (accessories) £12 12 5 (ECA 34/118) suppressed	£5 6 5 (ECA 34/102) plus £1 7 2 (accessories) £5 9 4 (ECA 34/118) suppressed
	"Duco Standard" ECA 34/99 and ECA 34/120	Hand	150 W	Lightweight, all-rubber nozzle, incorp. brush	—	Maroon body and bag	£5 16 0 (ECA 34/99) £6 2 1 (ECA 34/120) suppressed	£2 10 2 (ECA 34/99) £2 12 11 (ECA 34/120) suppressed
	"Duco De-Luxe" ECA 34/100 and ECA 34/119	Hand	150 W	Detachable metal nozzle, 2ft tube extension	Ext. tube, furniture brush and crevice tool	Maroon body and bag	£6 9 4 (ECA 34/100) £6 15 9 (ECA 34/119) suppressed	£2 16 0 (ECA 34/100) £2 18 9 (ECA 34/119) suppressed

Manufacturer	Name or Model	Type	Motor	Special Features	Accessories	Finish	Price (excl. tax)	Purchase Tax
BROWN BROTHERS, LTD., Great Eastern Street, London, E.C.2. *(continued)*	"Duco Super" ECA 34/110	Hand	160 W	TV suppressed, slide action switch	Ext. tube, oval brush, nozzle and crevice tool	Maroon and blue-grey	£6 15 0	£2 18 6
BYLOCK ELECTRIC, LTD., South Street, Enfield, Middlesex.	"Centurion"	Cylinder	400 W	T.V. suppressed	Full set brushes and nozzles	Oyster green hammered metal, chromium ends	£13 17 6	£6 1 10
	"Zephyr"	Cylinder	350 W	Switch in handle, skids replaced with four feet, T.V. suppressed	Full set brushes and nozzles	Beige, Bakelite fittings	£11 12 6	£5 2 2
	"Classic"	Cylinder	300 W	T.V. suppressed	Full set brushes and nozzles	Oyster green sprayed	£9 9 6	£4 3 0
	"Minivac"	Cylinder, hand	180 W	T.V. suppressed	Carpet nozzle, dusting brush, ext. wand	Off-white enamel body, plated accessories	£7 5 0	£3 3 7
R. CADISCH & SONS, Red Lion Square, London, W.C.1.	"Cadison"	Cylinder	250 W	Swivel hose connection	Carpet nozzle, brush, crevice tool	Black diced leatherette, plated ends	£8 15 0	£3 18 8
	"Cadison" 1013	Hand	160 W	Fitted with hard rubber nozzle	—	Black crackle	£5 19 6	£2 13 9
	"Cadison" 1024	Hand	160 W	Lightweight, contemporary styled	Ext. tube, brush, metal nozzle, crevice tool	Two-tone grey, black bag	£6 15 0	£2 19 3
	"Cadison"	Upright	275 W	Rubber wheels, insulated handle grip	2 ext. tubes, crevice nozzle, carpet nozzle and brush	Biscuit and brown	£12 12 6 £3 0 0 (accessories)	£5 13 6 £0 6 7 (accessories)
CO-OPERATIVE WHOLESALE SOCIETY, LTD., National Works, Hall Street, Dudley.	"Invincible" 6020	Cylinder	250 W	—	1 nozzle, 1 crevice tool, 2 brushes	Leatherette and chromium	£9 1 9	£4 1 10
	"Invincible" 6014	Cylinder	300 W?	—	2 nozzles, crevice tool, 2 brushes	Leatherette and chromium	£14 18 0	£5 19 1







1. *Cadisch "Cadison" cleaner*
2. *British Vacuum Cleaner & Engineering Co.'s "Ace" G.56 cleaner*
3. *Brown Brothers "Duco Super Silent" cleaner*
4. *British Vacuum Cleaner & Engineering Co.'s "Regal" G.38 cleaner*
5. *Bylock "Zephyr" cleaner*
6. *Bylock "Minivac" hand cleaner*

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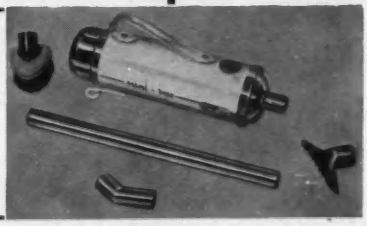

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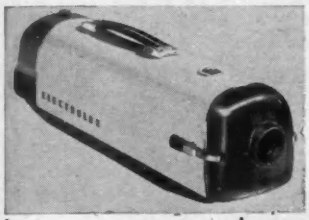
Manufacturer	Name or Model	Type	Motor	Special Features	Accessories	Finish	Price (excl. tax)	Purchase Tax
CO-OPERATIVE WHOLESALE SOCIETY, LTD., National Works, Hall Street, Dudley. *(continued)*	"Invincible" 6021	Cylinder	300 W	—	2 nozzles, crevice tool, 2 brushes	Leatherette and chromium	£10 3 0	£4 11 4
	"Invincible" 6023	Hand	180 W	—	Crevice tool, ext. tube, floor brush (ext. hose 11s 9d extra)	Metallic grey and maroon	£6 13 4	£3 0 0
ELECTRIX, LTD., Sterling Works, Dagenham, Essex.	"Silent Electrix" 270/161	Cylinder	350 W	Foot switch, screw-in hose, swivelled carpet nozzle, suppressed, up-the-stairs skids	Full set brushes and nozzles, and de-mother and spray gun	Black and chromium	£18 18 0	£8 5 10
	"Nu-Electrix"	Cylinder	350 W	Foot switch, screw-in hose, swivelled carpet nozzle, suppressed	Full set brushes and nozzles	Two shades of grey	£12 10 0	£5 9 8
ELECTROLUX, LTD., 153-5, Regent Street, London, W.1.	"Electrolux 62"	Cylinder	450 W	Increased mobility, throw-away dust bags, foot switch	Full set brushes and nozzles, sprayer	Light grey plastic covering, dark green ends	£23 7 1	£10 4 11
	"Electrolux 60"	Cylinder	300 W	Foot switch, air purification pad	Full set brushes and nozzles	White, black or red leather cloth, maroon end pieces	£18 19 6	£8 6 6
EXPRESS VACUUM CLEANER CO., 96, Bath Street, Birmingham, 4.	"Express"	Cylinder	200 W	—	Full set brushes and nozzles	Black rexine and chromium	£16 0 0	£7 4 0
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.4.	"Cleanette" U.95737	Hand	160 W	Brush nozzle	—	Two-tone grey	£6 13 5	£2 18 7
	"Cleanette De-Luxe" U.95738	Hand	160 W	Swivelled carpet nozzle, curved ext. tube	Brushes, nozzles, crevice tool and tubes	Two-tone grey	£8 2 8	£3 11 4
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.	"DM.310A"	Cylinder	400 W	Double insulated. Suppressed for radio and T.V.	Full set brushes and nozzles	Grey and maroon	£16 16 0	£7 7 6
	"DM.380"	Upright	150 W	Double insulated. Suppressed for radio and T.V.	Full set brushes and nozzles	Grey and maroon	£18 1 5 £3 13 2 (accessories)	£7 18 7 a£0 6 4 (ccessories)
	"DM.540"	Cylinder	500 W	Double insulated. Suppressed for radio and T.V., quiet running	Full set brushes and nozzles, and paper dust bags	Moonstone grey and red	£19 18 11	£8 15 1
GENWIND, New Trading Estate, Lode Lane, Solihull, Birmingham.	Genwind "One-Hand"	Hand	100 W	Lightweight	—	Black crackle and chromium	£7 0 0	£3 1 5
HOOVER, LTD., Perivale, Greenford, Middlesex.	"638" Standard	Upright	330 W	Exclusive agitator with beater bars and brushes. "Disposall" dust bag. "Dirt-finder" light. "Hooverflex" double-stretch hose	Full set brushes and nozzles in flexible non-scratch plastic	Blue plastic, grey metal	£24 17 6 £5 5 0 (accessories)	£11 3 11 £0 7 4 (accessories)
	"1224" Junior	Upright	200 W	Exclusive agitator with beater bars and brushes. "Hooverflex" double-stretch hose	All-purpose brush set in flexible non-scratch plastic, crevice nozzle	Wedgewood blue and sandalwood beige, red emblems and foot switch	£19 12 0 £3 10 0 (accessories)	£8 16 5 £0 6 6 (accessories)
	"912" Heavy-duty	Upright	330 W	Exclusive agitator with beater bars and brushes. "Dirt-finder" light	—	Black and grey metal	£25 15 0	£11 11 9
	"417E"	Cylinder	465 W	"Hooverflex" double-stretch hose	Full set brushes and nozzles	Light and dark blue and beige	£15 0 0	£6 15 0
	"Dustette" 2614	Hand	150 W	Shoulder strap. "Disposall" dust bag. "Hooverflex" double-stretch hose	Hose, ext. tube, 2 brushes set in flexible non-scratch plastic and crevice nozzle	Blue bag, grey metal	£11 9 0	£5 3 1

Manufacturer	Name or Model	Type	Motor	Special Features	Accessories	Finish	Price (excl. tax)	Purchase Tax
HOOVER, LTD., Perivale, Greenford, Middlesex. *(continued)*	"Dustette" 2504	Hand	150 W	—	All-purpose cleaning brush	Blue bag, grey metal	£9 9 0	£4 5 1
	"Constellation" 822A	Spherical	600 W	"Disposall" dust bag. "Hooverflex" double-stretch hose, swivels through 360 deg	Hose, ext. tube, 4 brushes set in flexible non-scratch plastic, carpet nozzle and crevice tool	Light and dark blue and grey, red emblems and foot switch	£23 2 0	£10 7 11
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, London, W.C.2.	"420"	Upright	250 W	Patented inner air-sleeve, foot operated switch	Full set brushes and nozzles	Grey stoved enamel, maroon bag	£18 4 10 £3 17 0 (accessories)	£8 0 2 £0 7 0 (accessories)



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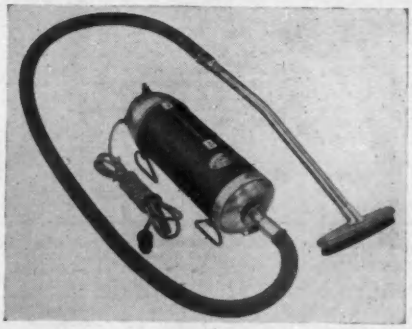

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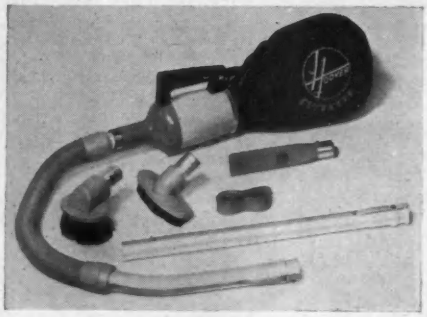

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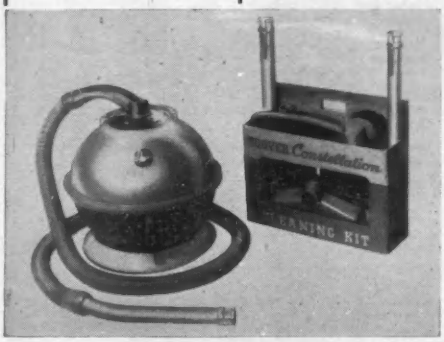
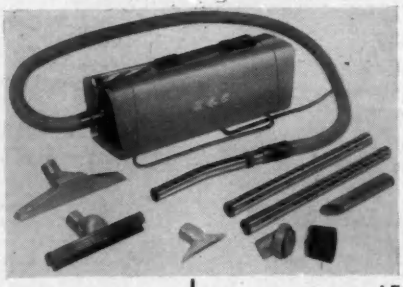


7. *Electrolux model "62" cylinder cleaner*
8. *Express Vacuum Cleaner Co.'s "Express" cleaner*
9. *Electrix "Silent Electrix" cleaner*
10. *Hotpoint model 420 cleaner*
11. *Hoover "Dustette" hand cleaner*
12. *Falk, Stadelmann "Cleanette" hand cleaner*
13. *Hoover "Constellation" spherical cleaner*
14. *G.E.C. "DM.380" upright cleaner*

Manufacturer	Name or Model	Type	Motor	Special Features	Accessories	Finish	Price (excl. tax)	Purchase Tax
MORPHY-RICHARDS, LTD., 50, Conduit Street, London, W.1.	"Super Suction"	Spherical	775 W to 950 W	Powerful suction, brushes and nozzles in washable plastic	Full set brushes and nozzles	Two-tone beige and deep bronze enamel	£19 1 0	£8 5 0
NASH ELECTRICAL CO., LTD., 82, Snow Hill, Birmingham, 4.	"Quikavac"	Upright	140 W	Lightweight	Full set brushes and nozzles	Various colours	£12 0 0	£5 8 0
PHOENIX SALES, LTD., Winton House, St. Andrew Street, London, E.C.4.	"Popular"	Cylinder	230 W	—	Full set brushes and nozzles	Leatherette body, nickel ends	£8 6 7	£3 15 0
	"Gloria"	Cylinder	230 W	—	Full set brushes and nozzles	Leatherette body, nickel ends	£9 2 0	£4 1 11
	"Major"	Cylinder	230 W	—	Full set brushes and nozzles	Brown leatherette body, chromium ends	£10 3 4	£4 11 6
	"Clipper"	Cylinder	230 W	—	Full set brushes and nozzles	Leatherette body, Bakelite insets, chromium ends	£10 18 0	£4 18 1
	"Jet Power"	Cylinder	480 W	Extra power and suction	Full set brushes and nozzles	Blue body, chromium ends	£12 19 8	£5 16 10
	"Power Flo"	Cylinder (Box)	480 W	Extra power and suction	Full set brushes and nozzles	Grey body, maroon Bakelite ends	£12 19 8	£5 16 10
	"Cyclone"	Cylinder	250 W	—	Full set brushes and nozzles	Hammered body, red enamelled end caps	£9 15 6	£4 8 0
SIROMA ENGINEERING CO., LTD., North Acton Road, Harlesden, N.W.10.	"Siroma" 1022	Hand	160 W	Slide action switch, simple dust bag release, T.V. suppressed	Ext. tube, brush, nozzle, crevice tool	Stoved enamelled mist blue and brown	£6 15 0	£2 19 3
	OB1020	Upright	275 W	Slide action switch. Radio and T.V. suppressed	Full set brushes and nozzles	Stoved enamelled biscuit and brown	£12 17 6 £3 0 0 (accessories)	£5 13 0 £0 6 7 (accessories)
SLOAN ELECTRICAL CO., LTD., 31-33, Bondway, Vauxhall, S.W.8.	"Summit" Standard	Cylinder	250 W	Foot switch, radio and T.V. suppressed	Full set brushes and nozzles	Light crocodile leathercloth, sprayed end caps	£9 7 0	£4 1 0
	"Summit" De-Luxe	Cylinder	250 W	Foot switch, radio and T.V. suppressed	Full set brushes and nozzles	Light crocodile leathercloth, chromium fitments	£9 15 0	£4 4 6
	"Summit"	Hand	160 W	Quick release bag, T.V. and radio suppressed	Ext. tube, brush and 2 nozzles	Cream and brown	£6 19 6	£3 1 2
	"Summit"	Upright	275 W	Slide action switch, T.V. and radio suppressed	Full set brushes and nozzles	Cream handle, brown bag	£12 16 8 £2 19 8 (accessories)	£5 11 2 £0 6 7 (accessories)
	"Super Summit"	Cylinder	350 W	Tubular runners, foot switch, 3-stage impeller, T.V. and radio suppressed	Full set brushes and nozzles	Light crocodile leathercloth, chromium fitments	£13 10 0	£5 17 0
ALBERT TAYLOR (MANCHESTER), LTD., Quay Street, Manchester, 3.	"Compet Major"	Upright	275 W	—	Full set brushes and nozzles	Grey anodised, black bag	£12 10 0 £2 17 6 (accessories)	£5 10 0 £1 5 3 (accessories)
	"Compet Senior"	Cylinder	350 W	Swivelled hose	Full set brushes and nozzles	Leatherette body, chromium ends	£12 0 0	£5 5 6
	"Compet Junior"	Cylinder	250 W	—	1 brush, 2 nozzles	Leatherette body, polished metal ends	£8 15 6	£3 17 3
	"Compet Handy"	Hand	160 W	Lightweight	1 brush, 2 nozzles	Two-tone grey, black bag	£6 15 0	£2 19 3
TELLUS SUPER VACUUM CLEANER, LTD., 39, Sheen Lane, Mortlake, S.W.14.	"R.41"	Canister	250 W	Hygienic metal dust container	Full set brushes and nozzles	Polished aluminium	£24 10 0	£11 2 2
	"S.59"	Canister	450 W	Hygienic metal dust container	Full set brushes and nozzles	Polished aluminium	£27 6 0	£12 7 6
VACTRIC, LTD., 196, Sloane Street, London, S.W.1.	"W.202"	Cylinder	400 W	Swivelled nozzle	Full set brushes and nozzles	Brown with fawn rexine body, aluminium ends	£21 5 0	£8 3 8
	"R.56"	Upright	210 W	Double dust bag, shadow light, moulded brushes with nylon bristles	Full set brushes and nozzles	Mustard coloured bag, moulded body	£18 18 0	£7 5 7



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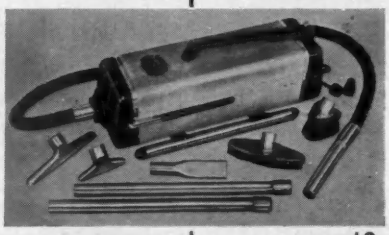

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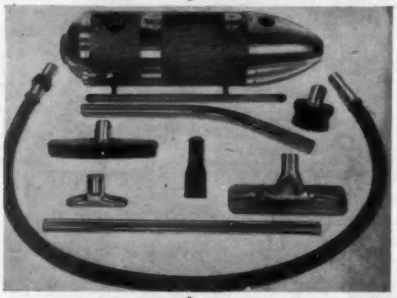

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15. *G.E.C. "DM.540" cylinder model*
16. *Morphy-Richards "Super Suction" spherical cleaner fitted with its new rubber-wheeled trolley*
17. *Vacuums "Bustler" upright cleaner*
18. *Phoenix "Power-Flo" cylinder model*
19. *Sloan "Super Summit" cleaner*
20. *Siroma model 1022 hand cleaner*
21. *Tellus "S.59" canister cleaner*
22. *Wholesale Fittings Co. "Alto-Bag" upright cleaner*
23. *Nash "Quikavac" upright cleaner*
24. *Vactric model R.58 upright cleaner*

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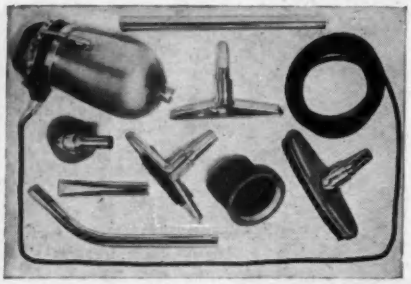

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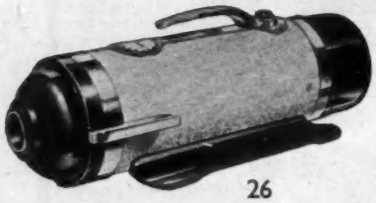

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25. *Water Softener's "Jifextra" cleaner*
26. *Vactric model W.303 cylinder cleaner*

Manufacturer	Name or Model	Type	Motor	Special Features	Accessories	Finish	Price (excl. tax)	Purchase Tax
VACTRIC, LTD., 196, Sloane Street, London, S.W.1. (continued)	"Hand Duster"	Hand	160 W	Lightweight	Ext. tube, 2 nozzles and brush	Maroon bag	£8 5 0	£3 3 7
	"W.303"	Cylinder	400 W	Foot operated switch, T.V. suppressed	Full set brushes and nozzles, plus de-mother and sprayer	Silver and black	£22 14 10	£8 15 2
	"R.58"	Upright	210 W	Foot operated switch, carpet dial, headlight and automatic latching handle	Full set brushes and nozzles	Maroon and silver grey	£21 12 10 £3 15 0 (accessories)	£8 6 8 £0 7 3 (accessories)
VACUUMS, LTD., Aldridge Road, Birmingham, 22B.	"Bustler"	Upright	130 W	Lightweight	Full set brushes and nozzles	Primrose enamel	£13 5 9 £2 19 4 (accessories)	£5 15 2 £0 4 7 (accessories)
WATER SOFTENER & VACUUM CLEANER SERVICE, LTD., 248, Romford Road, Forest Gate, E.7.	"Jifextra"	Hand	180 W	Dual purpose floor cleaner and "Vacette"	Full set brushes and nozzles	Crackle stoved enamel, chromium and polished aluminium	£11 11 0	£5 4 0
WHOLESALE FITTINGS CO., LTD., 44-52, Commercial Street, London, E.1.	"Alto-Bag"	Upright	275 W	T.V. suppressed, revolving brush	Brush, nozzle and crevice tool	Cream	£13 6 8 £2 18 4 (accessories)	£5 17 0 £0 6 4 (accessories)
	"Alto-Vac"	Cylinder	250 W	T.V. suppressed	Full set brushes and nozzles	Maroon	£9 6 8	£4 1 11
	"Alto Hand Cleaner"	Hand	160 W	T.V. suppressed	Ext. tube, brush, nozzle and crevice tool	Two-tone grey	£6 15 0	£2 19 3

FLOOR POLISHERS

Manufacturer	Name or Model	Type	Motor	Weight	Special Features	Finish	Price (excl. tax)	Purchase Tax
BYLOCK ELECTRIC, LTD., 109, South Street, Ponders End, Middlesex.	"532/3"	Three brush	325 W	24 lb	Incorporates scrubbers, scourers and polishers	Grey stoved enamel	£16 17 6 £17 8 0 (suppressed)	£7 8 2 £7 13 2 (suppressed)
COLUMBUS-DIXON, LTD., Capitol Works, Empire Way, Wembley.	"Columbus" III	Two brush	400 W	25 lb	Attachments for vacuum cleaning, dusting, drying and scrubbing	Aluminium	£43 15 0	£19 13 9
ELECTRIX, LTD., Sterling Works, Dagenham, Essex.	"Electrix"	Three brush	350 W	13½ lb	Lightweight, foot-operated switch	Fawn and brown	£15 0 0	£6 11 8
ELECTROLUX, LTD., 153-5, Regent Street, London, W.1.	"B.9"	Three brush	250 W	19 lb	Triangular body for getting into corners. Quiet action. T.V. suppressed	Maroon and grey hammer-tone enamel	£23 7 1	£10 4 11
	"Turbo Polisher" attachment	Single brush	—	6½ lb	For use with "Electrolux 62" vacuum cleaner	Grey hammer-tone enamel	£7 11 5	£0 16 7
ELECTRONA ELECTRICAL PRODUCTS, LTD., Islington Mill, James Street, Salford, 3.	"Duplex 75"	Two brush	400 W	23 lb	Air cooling fan	Brilliant hard enamel, chromium and polished aluminium	£21 10 0	£9 6 3
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.	"DM.342"	Two brush	270 W	15 lb	Double insulated, T.V. suppressed, automatic switching	Grey and maroon	£20 10 0	£9 0 0

Manufacturer	Name or Model	Type	Motor	Weight	Special Features	Finish	Price (excl. tax)	Purchase Tax
HOOVER, LTD., Perivale, Greenford, Middlesex.	"Hoover" 0212A	Two brush (contra-rotating)	225 W	13 lb	Scrubbing brushes and polishing pads. Headlight	Blue and beige plastic and metal	£21 0 0	£9 9 0
LADYBIRD APPLIANCES, LTD., Reliance Works, Oxford Road, Wokingham, Berks.	"Ladybird"	Two brush	200 W	8½ lb	Low priced, suitable for furniture, built-in overload clutch	Hammered gold, blue, black and white	£11 1 2	£4 13 10
TELLUS SUPER VACUUM CLEANER, LTD., 39, Sheen Lane, Mortlake, S.W.14.	"Tellus"	Three brush	300 W	24 lb	Quiet action, 2 sets brushes, felt pads	Polished aluminium	£29 11 9	£13 8 3
TRICITY COOKERS, LTD., 109, Kingsway, London, W.C.2.	"Tricity" TP.57	Three brush suction	350 W	20 lb	Triangular head, vacuum bag, headlight. Can be used for wet scrubbing	Grey and maroon stoved enamel	£17 10 4	£7 13 8
TRUVOX, LTD., 15, Lyon Road, Harrow, Middlesex.	"Juno" polisher/ scourer	Single brush	250 W	16½ lb	Revolving inner brush. Polishes, buffs, sands and scours	Chromium or stoved enamel	£18 18 0 (chromium) £17 10 0 (enamelled)	£8 5 11 (chromium) £7 13 8 (enamelled)
VACTRIC, LTD., 196, Sloane Street, London, S.W.1.	"Vactric" F.P.50H	Three brush	340 W	19½ lb	Rapid brush ejector. Interchangeable scrubbing brushes	Gold "Dimenso," maroon accessories	£21 5 0	£8 3 8

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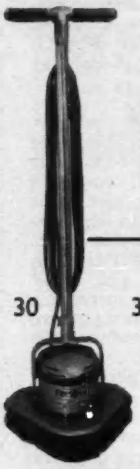

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27. *Truvox "Juno" polisher/ scourer*
28. *Vactric model F.P.50H 3-brush polisher*
29. *Electrix 3-brush polisher*
30. *Bylock model 532/3 polisher*
31. *Electrolux "B.9" polisher fitted with polish distributor*
32. *Hoover 2-brush polisher*
33. *Electrona "Duplex 75" polisher*
34. *Tellus 3-brush polisher*
35. *Tricity suction polisher*
36. *Ladybird Appliances lightweight polisher*
37. *G.E.C. "DM.342" polisher*

Financial Section

STOCKS and SHARES

STOCK EXCHANGE markets approached Easter in quiet and sober fashion. The insistence of Government spokesmen on the strictly limited significance of last month's Bank Rate reduction has continued effectively to scotch any tendency to take it as a first step towards a general loosening of the credit squeeze. Investment enterprise has been held in suspense also by the course of the current wage negotiations and of the American business depression, as well as by the approach of the Budget. Price movements in both the gilt-edged and industrial sections have been tending to become irregular, but in the circumstances markets could be said to have performed satisfactorily. In the electrical market, talk of an early capital issue by Associated Electrical Industries gained some currency and unsettled a little the shares of the big groups. The annual meeting of A.E.I. has been fixed for next Wednesday (9th April).

Enfield Cables Dividend

The £1 shares of Enfield Cables were marked up sharply from 11s 6d to 13s as a first reaction to the company's announcement of a 2½ per cent dividend for 1957, and of an improvement in the group surplus from £103,000 to £163,000. After taxation and other charges there is a net profit of £60,000, of which the preference and ordinary dividends absorb £43,000. Fluctuations in metal prices during the year (in the course of which copper fell from about £270 to £180 per ton) reduced the profit by £130,000: in the previous year there had been a loss of £85,000 under the same heading. On the basis of the 2½ per cent payment the shares are on a yield basis of just over 3¾ per cent. The full report is awaited with interest for the comments of Mr. H. J. Randall, the chairman, on the improvement in the position.

Preference Shares

Prices of the two preference share issues of Enfield Cables were raised moderately on the strength of the company's report of increased profits, the 7½ per cent shares to 14s, and the 4½ per cents to around 8s 3d. Net cost of the annual dividends is now shown to be covered nearly three times over by the earnings available, whereas last year their payment left a deficiency. Yields on both the preference shares are over 10½ per cent. Among other preference shares in the cable and telephone group, Johnson & Phillips 4½ per cent redeemable shares have been offered lately at 11s, to yield over 8 per cent, and Hackbridge Holdings "fives" at 15s 6d to yield approximately 6½ per cent. On B.I.C.C. 5½ per cents at 18s, and Ericsson Telephone "sevens" at 23s, the returns are a fraction over 6 per cent.

Company News

Good figures had been looked for in the Pressed Steel Company's annual results, having regard to last year's revival in the motor industry, and best expectations were realised upon the announcement of a 60 per cent increase in the net profit for 1957, to £1½ million, and a final dividend of 14 per cent. The latter makes for the year a total of 20 per cent (against 15 per cent previously), which appears to involve the distribution of less than one-third of the surplus. After the news the 5s shares were marked up from 14s 9d to 15s 6d, making the yield 6½ per cent. British Aluminium £1 shares were quoted lower, at 45s, after the announcement of this company's annual results, although the 9 per cent reduction in the trading profit was not unexpected in view of the industry's difficulties last year, and the 8 per cent final dividend, payable on increased capital and making a total of 12 per cent, is the rate forecast by the company at the time of the share issue.

I.C.I. Results

An excellent statement from Imperial Chemical Industries on the financial results for 1957 helped to sustain morale generally in the industrial market. The increase of £5 million in the net group income to £55·1 million (before tax of £26·3 million) confirmed satisfactorily the improvement reported half way through the year; an increase of 2 per cent in the final ordinary dividend, making a total of 12 per cent, was better than most expectations, and the proposal of a one-for-two scrip issue came as an agreeable surprise. There was a good response from the company's £1 shares, which were marked up initially by about 3s 9d, to 44s. On the new rate of dividend the yield is just on 5½ per cent.

Convertible Stocks

The good financial results reported recently by I.C.I. and Pressed Steel reacted well upon the convertible loan and debenture stocks in issue by these companies. In the last year or two this has become a very popular form of investment, giving the holder the protection of a fixed rate of interest in conjunction with an option to convert holdings into the ordinary shares of the company concerned during the next few years. In the case of the I.C.I. 5½ per cent convertible loan the price has lately been 107, giving a yield of 5·1 per cent on the fixed dividend. At this price the conversion rights represent in effect an option on the ordinary shares at prices of approximately 44s 9d later this year, at 46s 6d next year, or at 48s 9d in 1960. Recently the market quotation has been 44s. The Pressed Steel 5½ per cent convertible debenture has been available at about 108, to yield just over 5 per cent, with the right to convert into the ordinary shares on terms equivalent to about 15s 6d this year, rising to 16s 9d in 1961, as compared with the recent market price of 15s 6d.

Owing to the Easter holiday our usual share list is omitted; it will appear again on 18th April.

Philips Lamps

Quarterly reports are issued by Philips Incandescent Lamp Works, of Holland, so that expectations had been prepared for the good figures recently reported by the company for the full twelve months in 1957. Turnover and profits are both stated to have improved by about 18 per cent, so that the dividend, which remains at the previous rate of 14 per cent, is substantially covered by the earnings available. These results carry on a line of uninterrupted expansion since the war. The shares are of Fl. 10 denomination and in the form of unit certificates to bearer. Dividends are paid normally, to residents of this country, without deduction of the Dutch dividend tax, and are converted into sterling at the rate of exchange prevailing. Quoted at 52s, the shares offer a yield of approximately 5 per cent at the present rate of exchange.

Views on Trade Prospects

Addressing members of the Northern Branch of the National Association of Manufacturers last week, Sir Claude D. Gibb, chairman of C. A. Parsons & Co., Ltd., said that no one in Britain should start talking about a trade recession. British trade need not depend upon American economy.

Britain had not had to sell really competitively but the position had now changed. There was no need to fear a depression in Britain if manufacturers went out and looked for orders. This was the only method of securing new markets. Sir Claude referred to the substantial falling off in United States car and steel production. The U.S. steel industry did not expect a real recovery until the late autumn, with full activity next spring. This was a different view from that taken in U.S. Government circles. Sir Claude expressed the view that America's trouble had arisen from "a fantastic armaments programme."

Referring to his recent business tour of South America, the West Indies, Mexico, the United States and Canada, Sir Claude said he had not come back empty-handed. He had "cleaned up" in Trinidad, had not done badly in Venezuela, and had broken the ice in Mexico. He added that Mexico was a country developing at a fantastic rate.

REPORTS and DIVIDENDS

Mather & Platt, Ltd.—Addressing shareholders at the annual meeting held on 27th March, Mr. L. E. Mather (chairman) said that during the past year they had made considerable progress in methods of design, production and sales. The home market, which provided about 60 per cent of their turnover, had been so far little affected by the credit squeeze, the capital requirements, for instance of electricity, coal, atomic energy and chemicals being well maintained. Overseas, the pattern of markets showed considerable changes. In India the exchange position had limited the amount of exports from this country and where business was possible, permits carried with them credit terms which were difficult to accept. South Africa showed every sign of expansion, and the demand for capital goods was increasing. However, local manufacture or assembly of imported parts was steadily gaining ground and their subsidiary company was taking steps to comply with this tendency. Substantial contracts had been received from the Soviet Union for food machinery. As members of the consortium formed to supply tyre making plant for the U.S.S.R., they had already received large orders. Included in the equipment were fully automatic lines for the preparation of nylon tyre cords. The volume of orders for the first quarter of the current year was well maintained and inquiries over a wide range of products were encouraging.

Ericsson Telephones, Ltd.—The annual meeting was held on 28th March, Sir Harold A. Wernher (chairman) presiding. In the course of his speech the chairman said that the year under review commenced with a good order book and business subsequently received enabled them to maintain a high level of production throughout the year. Turnover from the factories was up by 12 per cent, but operating costs were higher, due primarily to a substantial increase in the weekly wage bill. Some of the improvements and extensions at the main factory at Beeston, reference to which was made at the last annual meeting, were completed and brought into service during the year and contributed to the greater volume of production. As for some years past, nearly half of the total production was sold overseas. They had started the present year with a good order book.

Enfield Cables, Ltd. — The preliminary statement for 1957 shows a group surplus of £162,885, as compared with £103,051 for 1956. It is stated that losses on fluctuations in metal prices reduced the profit in 1957 by £130,000 (against £85,000 in 1956). After deducting interest and £30,520 for taxation, there is a net profit of £60,150 (against a loss of £16,531). It is proposed to pay an ordinary dividend for the year of 2½ per cent, to transfer £13,292 to sinking fund for redemption of debenture stock, and to carry forward £104,196 (against £99,025 brought in). The last ordinary distribution was 5 per cent for 1952.

The British Aluminium Co., Ltd., reports a consolidated surplus for 1957 of £4,135,239, as compared with £4,485,357 for the preceding year. From this is deducted depreciation, interest, etc. A credit of £651,720 is added for unrequired tax provisions, and the net taxation deduction for the year is £965,625. The net profit amounts to £1,899,109 (against £1,584,269), of which £1,562,270 is attributable to the parent company. It is proposed to pay a final ordinary dividend of 8 per cent on capital increased from £7 million to £9 million, which with the 4 per cent interim dividend paid on the old capital makes 12 per cent for the year (unchanged). General reserve receives £300,000 and the balance carried forward is £541,783 (against £520,422 brought in).

The Pressed Steel Co., Ltd., reports that after providing £1,980,930 for taxation, the net profit for 1957 is £1,527,121, as compared with £951,682 for 1956. General reserve receives £500,000 and it is proposed to pay a final dividend of 14 per cent (against 10 per cent), making 20 per cent (15 per cent) for the year. The balance carried forward is £1,847,822 (against £1,363,023 brought in).

The Superheater Co., Ltd.—The trading balance for 1957 is £645,651, as compared with £598,410 for the previous year, and after added income from other sources, the balance, before taxation, is £678,610 (£620,221). Taxation charged amounts to £332,172, and the net profit is £346,438 (£322,049). Reserves are increased by £200,000 and it is proposed to pay a final dividend on the combined ordinary and "A" ordinary capital of 30 per cent, plus a bonus of 2½ per cent, making 42½ per cent (40 per cent) for the year. The balance carried forward is £128,500 (against £101,386 brought in).

Parkinson & Cowan, Ltd.—Group trading profits for 1957 amount to £583,165, as compared with £597,497 for 1956, and after meeting all charges, including £174,375 for taxation, the net balance is £156,760 (against £171,536). Reserves receive £40,000 and the dividend for the year is unchanged at 9 per cent.

The Telephone & General Trust, Ltd., reports a group profit for 1957 of £633,464, as compared with £606,919 for the previous year. Taxation requires £233,942 and the net profit is £399,522 (against £401,197). It is proposed to pay a final dividend of 8 per cent, making 13 per cent for the year. A similar distribution was made for 1956, but the interim dividend of 3 per cent that year was paid on smaller capital. The dividend on the "A" ordinary capital is also maintained at 13 per cent.

Sangamo Weston, Ltd.—After providing £124,559 for taxation, the net profit for 1957 is £167,328, as compared with £203,512 for 1956. The dividend for the year is maintained at 12½ per cent.

The Perak River Hydro-Electric Power Co., Ltd., has declared an interim dividend of 4 per cent (unchanged).

The Nigerian Electricity Supply Corporation, Ltd., is paying an unchanged interim dividend of 4 per cent.

Joseph Lucas (Industries), Ltd., has declared an interim dividend of 2½ per cent (unchanged).

New Companies

John Whitelaw, Ltd.—Registered in Edinburgh 5th March. Capital £5,000. To acquire the business of electrical contractors carried on by John Whitelaw & Sons at 17, Townhead Street, Strathaven, etc. Directors: J. Whitelaw, jnr. and J. B. Whitelaw.

W. A. Howe & Sons, Ltd.—Registered 10th March. Capital £100. Electrical and radio engineers, etc. Directors: W. A. Howe and D. Howe. Regd. office: 6, Church Street, Ormskirk, Lancs.

Talbots Electronics, Ltd.—Registered 10th March. Capital £1,000. Electrical and radio engineers, etc. Directors: R. A. Talbot and Doris E. Talbot. Regd. office: 31, Chapel Lane, Formby, nr. Liverpool.

Bankruptcies

R. J. Phipps, electrical engineer, formerly carrying on business in partnership with another at 4, King Street, Tamworth, Staffs, under the style of Phipps Bros., electrical contractors.—Receiving order made 18th March on debtor's own petition.

R. H. Henley (trading as Green & Henley), 92, Hersham Road, Hersham, Walton-on-Thames, Surrey, lately carrying on business at 79, High Street, Walton-on-Thames, export merchant (electrical goods).—Trustee, Mr. C. T. Newman, 58-61, York Terrace, Regent's Park, London, N.W.1, released 17th March.

R. Phœnix, 38, Wilford Road and 36, Beech Avenue, Nottingham, television, radio and electrical dealer.—Trustee, Mr. F. C. R. Moule, 2, Regent Street, Park Row, Nottingham, released 3rd March.

G. A. Adams, 51, Hollyfaste Road, Sheldon, Birmingham, motor body builder inspector, previously carrying on business at first in partnership with another at 90, Jamaica Row, Birmingham, and latterly from 1, Ings Road, Wombwell, East Riding, also, under the style of Electro-Neon Lighting Co., electrical contractor.—First and final dividend of 6d in the £, payable on and from 16th April at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham, 2.

G. S. Douthwaite, 25, Dean Street, Newcastle-on-Tyne, trading as G. S. Douthwaite & Co., electrical engineer.—Third supplemental dividend of 11¾d in the £, payable at the Official Receiver's office, Clarendon House, Clayton Street West, Newcastle-on-Tyne, 1.

Liquidations

Britton Electronic, Ltd.—Meeting of creditors on 21st April at 77, Portland Place, London, W.1, to receive an account of the winding-up by the liquidator, Mr. F. Goodman.

Dirks Electronic, Ltd.—Meeting of members on 25th April at 30, Brown Street, Manchester, 2, to receive an account of the winding-up by the liquidator, Mr. J. Seal.

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 7th April

DUNDEE.—Mathers Hotel, 7.30 p.m. Incorporated Plant Engineers, Dundee Branch. "The Uses of Electronics," by R. B. Smith.

EDINBURGH.—Carlton Hotel, North Bridge, 7 p.m. I.E.E. South East Scotland Sub-Centre. "Broad-Band Slot-Coupled Microstrip Directional Couplers," "Re-entrant Transmission Line Filter Using Printing Conductors," and "The Application of Printed-Circuit Techniques to the Design of Microwave Components," by J. M. Dukes.

NEWCASTLE-ON-TYNE.—Ministry of Labour and National Service, 93a, Grey Street, 6.30 p.m. Institution of Works Managers, Tyne-Wear Branch. Annual general meeting.

SHEFFIELD.—Royal Victoria Station Hotel, 7.30 p.m. A.S.E.E. Sheffield Branch. "Aluminium Sheathed and Cored Cables," by D. Raine.

Tuesday, 8th April

GLASGOW.—Royal College of Science and Technology, George Street, C.1, 7 p.m. I.E.E. South-West Scotland Sub-Centre. "Storage and Manipulation of Information in the Brain," by R. L. Beurle.

LUTON.—Staff Canteen, D. Napier and Son, The Airport, 6 p.m. I.E.E. London Graduate and Student Section. District meeting. "Transistor Amplifier Circuits," by W. A. Thorpe.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "Design and Application of Large Solid-Rotor Asynchronous Generators," by P. Richardson.

Engineers' Club, Albert Square, 7.15 p.m. Incorporated Plant Engineers, Manchester Branch. "Modern Developments in Diesel Rail Transport," by Mr. Montague.

PORTSMOUTH.—Wiltshire Lamb Hotel, 7.30 p.m. A.S.E.E. Portsmouth Branch. "Lighting in Crime Detection," by C. H. Edlin.

Wednesday, 9th April

BIRMINGHAM.—Birmingham Exchange and Engineering Centre, Stephenson Place, 7.30 p.m. A.S.E.E. Birmingham Branch. "Electric Melting Furnaces," by W. L. Harrison.

BLACKBURN.—N.W.E.B. Lecture Theatre, Jubilee Street, 7.15 p.m. I.E.E. North Lancashire Sub-Centre. "Cathodic Protection," by L. B. Hobgen, K. A. Spencer and P. W. Heselgrave.

BRADFORD.—Midland Hotel, 7.30 p.m. A.S.E.E. Bradford Branch. "Kopp Variators."

BRISTOL.—Grand Hotel, 7.15 p.m. Incorporated Plant Engineers, Western Branch. "The Plant Engineer and Work Study," by H. A. Gomm.

HALIFAX.—Crown Hotel, Horton Street, 7.45 p.m. A.S.E.E. Halifax Branch. "Travels with a Cine-Camera," by C. C. Thomas.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio and Telecommunication Section. Informal evening on "U.H.F. Test Transmissions."

1, Birdcage Walk, Westminster, S.W.1, 6 p.m. Institution of Mechanical Engineers, Steam Group. Discussion on "The Combined Nuclear/Fossil Fuel Cycle."

NEWCASTLE-UPON-TYNE.—At the Institution of Mining and Mechanical Engineers, Neville Hall, Westgate Road, 6 p.m. British Institution of Radio Engineers, North Eastern Section. Annual general meeting, followed by a programme of technical films.

Wednesday, 9th April, to Friday, 11th April

BRISTOL.—University of Bristol. Institute of Physics, South Western Branch and Education Group. Conference on the Teaching of Science in Schools.

Thursday, 10th April

BARROW-IN-FURNESS. — N.W.E.B. Demonstration Theatre, Duke Street, 7.15 p.m. I.E.E. North Lancashire Sub-Centre. "Cathodic Protection," by L. B. Hobgen, K. A. Spencer and P. W. Heselgrave.

DUNDEE.—Electrical Engineering Department, Queen's College, 7 p.m. I.E.E. North Scotland Sub-Centre. "The Potentialities of Railway Electrification at the Standard Frequency," by E. L. E. Wheatcroft.

GLASGOW.—Scottish Building Centre, 425-427, Sauchiehall Street, 7.15 p.m. Incorporated Plant Engineers, Glasgow Branch. "The Design of Industrial and Hospital Engineering Services," by E. S. Hancock.

LIVERPOOL.—Exchange Hotel, 7.15 p.m. Incorporated Plant Engineers, Merseyside and North Wales Branch. Chairman's address.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers, ordinary meeting. "Radio Observations on Artificial Satellites," by J. A. Ratcliffe.

St. Ermin's Hotel, Westminster, S.W.1. Combustion Engineering Association, Southern Region meeting. 10 a.m. "The Measurement of Oxygen in Flue Gases," by F. T. Ashmore, and "The Measurement of Oxygen in Feed Water," by M. S. Timms. 2.30 p.m. "Chemical Engineering in the Coal Industry," by Dr. G. I. Jenkins.

NOTTINGHAM. — Demonstration Theatre, E.M.E.B., Smithy Row, 6 p.m. I.E.S. Nottingham Centre. "Display and Small Store Lighting," by J. R. Just.

SWANSEA. — Conference Rooms, South Wales Electricity Board Showrooms, The Kingsway, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "Nuclear Engineering," by D. R. Smith.

WIMBLEDON. — Prince of Wales Hotel, 7.45 p.m. A.S.E.E. South West London Branch. "Personal Wartime Intelligence Experiences," by Major G. Instone.

Thursday, 10th April, to Saturday, 12th April

EASTBOURNE.—Grand Hotel. F.B.I. Conference on Nuclear Energy.

Friday, 11th April

ABERDEEN. — Robert Gordon's Technical College, 7.30 p.m. I.E.E. North Scotland Sub-Centre. "The Potentialities of Railway Electrification at the Standard Frequency," by E. L. E. Wheatcroft.

LEEDS.—Mansion Hotel, Roundhay Park, 7 p.m. I.E.S. Leeds Centre. Annual general meeting and social evening.

LIVERPOOL.—At the Liverpool Engineering Society, 9, The Temple, 24, Dale Street, 7.30 p.m. A.S.E.E. Liverpool Branch. "General Factory Requirements for Electrical Installations," by D. A. Picken.

LONDON.—Pepys House, 14, Rochester Row, Westminster, S.W.1, 7 p.m. Junior Institution of Engineers. "Industrial Applications in Connection with Television," by T. M. C. Lance.

Savoy Place, W.C.2, 6.30 p.m. I.E.E. London Graduate and Student Section. "The Engineering Aspects of the British Controlled Thermo-nuclear Reaction Experiments," by R. Carruthers.

STOKE.—Grand Hotel, Hanley, 7.30 p.m. A.S.E.E. Stoke and Crewe Branch. "Electrical Safety," by J. Jones.

Saturday, 12th April

AYLESBURY.—Hampden Buildings, Temple Square, 7 p.m. A.S.E.E. Oxford, Reading and Districts Branch. "Lighting Installation Design."

NOTTINGHAM. — A.S.E.E. Nottingham Branch. Visit to the Crown Derby Works.

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 12th April:—

STENARC. No. 771,191. Class 7. Electrically operated and gas operated machines and apparatus, all for the use in the arc welding, cutting, brazing and the like heat treatment of metals, and parts.—British Oxygen Gases, Ltd., Bridgewater House, Cleveland Row, St. James's, London, S.W.1.

ROBLEC. No. 772,265. Class 7. Machines for washing, drying and ironing of clothes. ROBLEC. No. 772,266. Class 9. Electric flat irons. ROBLEC. No. 772,267. Class 11. Fires, radiators, fans, toasters, and hot plates and boiling rings, for cooking and the like purposes, all being electrically operated goods. —Robson Electrical Products, Ltd., Ultralite Works, Union Street, West Bromwich.

BELLING-LEE. No. 756,006, and BL (design). No. 761,515. Class 9. Aerials, radio and television amplifiers, electrical interference suppression devices, holders for electric fuses, holders for thermionic valves, printed electrical circuits, lightning arrestors, transmission lines for aerials; and signal attenuators, terminals, plugs, sockets, connectors, fuses, switches, cut-outs, filters and signal transformers, all being electric.—Belling & Lee, Ltd., Great Cambridge Road, Enfield, Middx.

POTERMO. No. 770,892. Class 9. Insulated electric cables, insulated electric wire, electric fuse wire; insulated electricity conductors for use in the engineering industry; and electrical resistances made of wire.—N.V. Pope's Draadenen Lampenfabrieken, Venlo, Holland. Address for service, c/o T. D. Threadgold, Century House, Shaftesbury Avenue, London, W.C.2.

POLLYPUT. No. 772,397. Class 9. Electric kettles.—Fordham Pressings, Ltd., Melbourne Works, Dudley Road, Wolverhampton.

MUTAC. No. 772,628. Class 9. Electric switches, electric bell pushes, switchgear and parts.—General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

SEMICS. No. 772,681. Class 9. Electrical apparatus incorporating semi-conducting materials.—Semi-Metals, Ltd., 56, Vicarage Lane, Ilford, Essex.

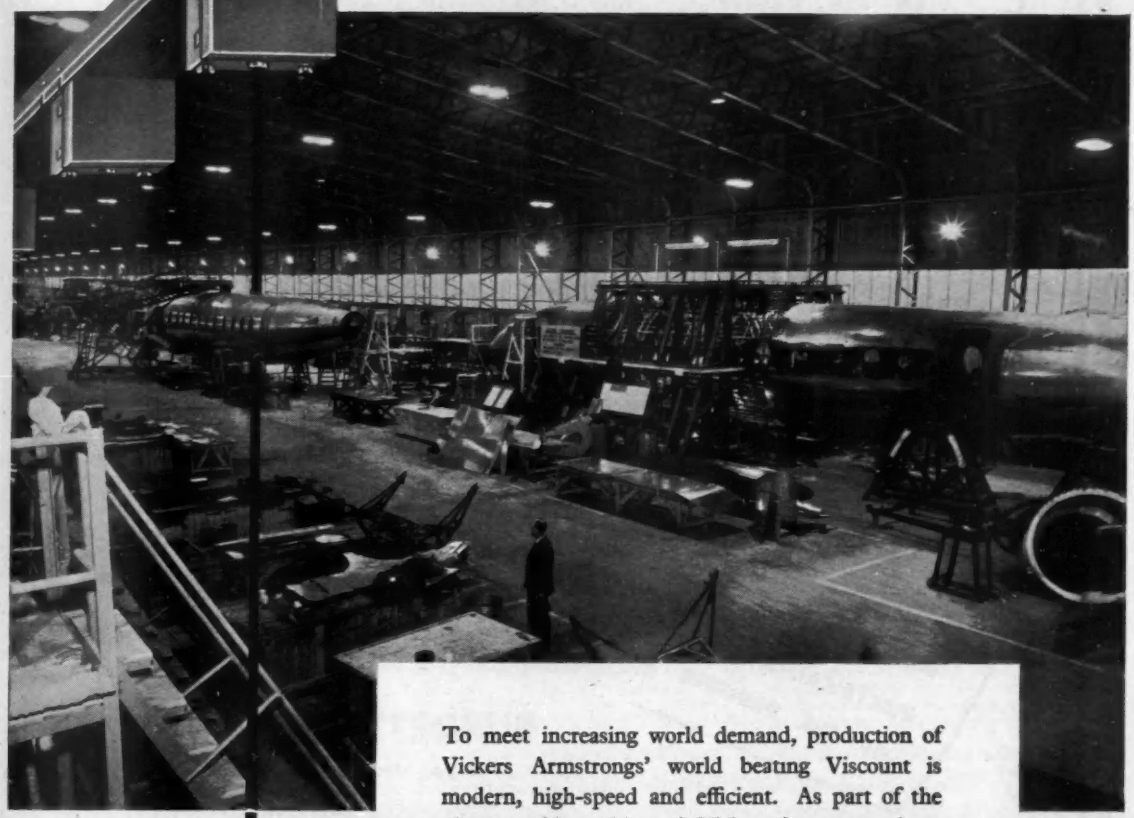
COMMANDO. No. 767,289. Class 11. Torches, electric lamps and electric lamp bulbs therefor. — Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, London, N.7.

MOSILIT. No. 770,647. Class 11. Moulded electric heating elements made of sintered pulverous masses having a base of molybdenum silicide.—Siemens Planiawerke Akt.-Ges. für Kohlefabrikate, Augsburg, Germany. Address for service, c/o Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

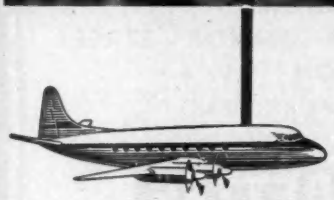
GREAT HARRY. No. 771,995. THE MAYFLOWER. No. 772,045. Class 11. Electric lamps.—Jan Westerman, Junr., Hilversum, Holland. Address for service, c/o Barker, Brettell & Duncan, 16, Greenfield Crescent, Edgbaston, Birmingham.

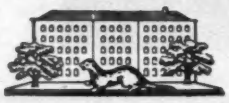
AMERIDRY. No. 772,852. Class 11. Electric heating elements.—L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, Kingsway, London, W.C.2.

ahead on the ground, too!



To meet increasing world demand, production of Vickers Armstrongs' world beating Viscount is modern, high-speed and efficient. As part of the plan to achieve this end, Vickers Armstrongs have installed Ottermill Busbar Trunking at their Weybridge factory. A tap-off position is provided every two feet and connections can be made with complete safety while the system is alive.





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CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Argentina.—Water and Electricity Board. 7th August. Electromechanical equipment for Aguas del Toro hydro-electric power station, Mendoza. (E.S.B. 7524/58. Ten/31622.)*

Burma. — Electricity Supply Board, Rangoon. 25th April. Approximately 5,000 current limiting devices for limiting the demand of flat rate consumers. (E.S.B. 7616/58. Ten/31595.)*

France.—Supreme Headquarters Allied Powers Europe, Paris. 168 tropospheric antenna assemblies (approximate value £3·4 million). (GD.7/57. Ten/31644.)*

Huddersfield.—Firms wishing to tender for the installation of electric lifts at the College of Technology should apply to chief education officer by 28th April. (See this issue.)

India.—Damodar Valley Corporation, Calcutta. 9th May. Power and control cables for Durgapur power station and Bokaro 4th unit. (E.S.B. 7861/58. Ten/31633.)*

Government of Andhra Pradesh Electricity Department. 15th April. 150 distribution transformers ranging from 25 kVA to 75 kVA. (E.S.B. 8349/58. Ten/31730.)*

Iran.—Plan Organisation, Tehran. 12th May. Electrical equipment for Tafrech power station. (E.S.B. 28281/57. Ten/29483A.)* (Re-issue of call for tenders). 17th May. Electricity distribution scheme for the town of Hachtpar. (E.S.B. 7857/58. Ten/31670.)*

Iraq.—Directorate General of Municipalities, Baghdad. 26th April. Electric lamps and fittings. (E.S.B. 7789/58. Ten/31619.)* Forty-five transformers and accessories. (E.S.B. 7790/58. Ten/31618.)*

Jordan.—Jordan Central Electric Co. (S.A.), Amman. Generating plant, electrical installations, and civil engineering work for Zerka power scheme. (E.S.B. 7718/58. Ten/31657.)*

London.—India Store Department. 9th May. Cables. (See this issue.)

New Zealand.—G.P.O., Wellington. 28th April. Telephone switchboard wire. (E.S.B. 7586/58. Ten/31592.)* Microphones. (E.S.B. 7587/58. Ten/31606.)*

Pakistan.—Government Department of Supply and Development, Chittagong. 28th April. 2,748 dry cells. (E.S.B. 7715/58. Ten/31614.)*

Peterborough.—City Council. 15th April. Electrical installations in 116 houses and 24 flats. (See this issue.)

South Africa.—Durban City Council. 9th May. 33 kV metalclad double busbar switchgear. (E.S.B. 7681/58. Ten/31602.)*

Thailand.—Sugar Organisation, Vangdaeng. 25th April. Boiler and generating set. (E.S.B. 8223/58. Ten/31727.)*

ORDERS PLACED

Hebburn-on-Tyne.—U.D.C. Electrical installations in 70 new houses on the Campbell Park estate (£1,999).—A. Robinson.

Lancashire.—County Council Education Committee. Rewiring of Nelson and Colne College of Further Education (£2,766).—North Western Electricity Board.

London.—St. Pancras Borough Council. Electrical installation at the Cranleigh Street housing scheme (£3,565).—E. Wight & Co. (Muswell Hill).

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Aberdeenshire.—Further phase of scheme for academy, Fraserburgh (£211,860); county architect, County Buildings, Aberdeen.

Barnet.—Factory for Russell McDonald & Co.; Howard Farrow, Ltd., builders, 1, Russell Parade, London, N.W.11.

Bedford.—Three 12-storey blocks containing 204 flats; Drabble Construction Co., Ltd., Wellingborough, Northants.

Belfast.—20-storey offices, Castle Street/Fountain Street corner site; Morris de Metz, architect, 2, Ludgate Hill, London, E.C.4.

Bellshill (Lanarkshire).—R.C. secondary school at Orbiston (£108,533); D. G. Bannerman, county architect, 34, Albert Street, Motherwell.

Birmingham.—Four-storey maisonnettes (36), Gooch Street redevelopment area; A. G. Sheppard Fidler, city architect, Civic Centre, 1.

Bishop Auckland.—Forty old people's bungalows for U.D.C.; J. Ford, surveyor.

Brighton.—First instalment of College of Technology; borough engineer.

Bristol.—Works, Chittening area; Imperial Chemical Industries, Ltd., Buckingham Gate, S.W.1.

Carlisle.—Church at Wigton Road; W. C. Mangan, architect, 2, Ribblesdale Place, Preston.

Chester.—New buildings for King's School, Wrexham Road; Farquharson & McMorran, architects, 14, North Audley Street, London, W.1.

Crawley.—Cinema and ballroom proposed; Frank Verity and S. Beverley, architects, 35, Doughty Street, London, W.C.2.

Offices, New Town; Godman & Kay, architects, 13, North Parade, Horsham.

Crewe.—Central College of Education, Vine Tree Farm site; J. G. Kellett, director of education, City Road, Chester.

Doncaster.—Chest clinic for General Infirmary; Pite, Son & Fairweather, architects, 6, Queen Anne's Gate, London, S.W.1.

Eastbourne.—Concert and conference hall (£450,000); Westwood, Sons & Partners, architects, Suffolk Street, London, S.W.1.

Eccles.—Flats (36), Cawdor Street; Frank Bradley, architect, 4, Wood Street, Bolton.

Glasgow.—Flour mills, Shearer Street; Gelder & Kitchen, architects, 120, Alfred Gelder Street, Hull.

Halifax.—Works, Albert Road; Modern Foundries, Ltd., High Well Road.

Hornsey.—Large extensions to High School for Girls (£117,350); county architect, 1, Queen Anne's Gate Buildings, London, S.W.1.

Ipswich.—Infants' school, Sprites Lane; Johns, Slater & Haward, architects, 32, Foundation Street.

Leicester.—Extensions at College of Technology and Commerce, Belgrave Gate (£210,000); city architect.

Liverpool.—Works extensions; Harrison & Jones, Ltd., Purax Mills, Vauxhall Road.

London.—Science block and hostel, College of St. Mark and St. John, Kings Road, Chelsea; Kendrick, Findlay & Partners, architects, 5, Cromer Street, W.C.1.

Extensions, School of Oriental Studies, Woburn Square, Bloomsbury; Adams, Holden & Pearson, architects, 38, Gordon Square, W.C.1.

Office block, Snow Hill, Smithfield; Russell Building & Contracting Co., Ltd., 165, Plymouth Grove, Manchester, 13.

Office block, Dean Street, Soho; Tersons, Ltd., builders, 4, Dollis Park, Finchley, N.3.

Loughborough.—Workshop block, gymnasium and hostel block at the Teachers' Training College (£141,000); county architect, 123, London Road, Leicester.

Houses, Ashby Road estate (78) and Victoria Street (67); W. Granger, borough engineer, Southfields.

Melton and Belvoir.—Houses (70), on sites at Asfordby, Bottesford, Branston, Hose, Frisby and Long Clawson; R.D.C. surveyor, Warwick Lodge, Dalby Road, Melton Mowbray, Leicestershire.

Merthyr Tydfil.—Goytre Primary School (£100,000); C. Bryant & Son, Ltd., builders, 65, Whitmore Road, Small Heath, Birmingham, 10.

Middlesbrough.—Operating theatre suite at Hemlington Hospital for Newcastle Hospital Board (£38,000); N. Thompson, Ltd., contractors, Stonehouse Street.

Newcastle-on-Tyne. — Factory additions, Westmorland Road, for Tyne Textiles, Ltd.; M. Gatoff, architect, 26, Mosley Street.

Flats, maisonnettes and shops, Church Street, Walker; city architect, 18, Cloth Market.

Northampton.—New Kingsthorpe Girls' Secondary School (£144,000); William Sindall, Ltd., Cambridge.

Old Fletton.—Private estate of 141 houses; C. W. Shelton, Ltd., builders, Eastgate, Peterborough.

Peterborough.—Third instalment of Technical College; Portess & Richardson, architects. Lloyds Bank Chambers, Cathedral Gateway, Peterborough.

Plymouth.—Factory extensions for Farley's Infant Food, Ltd., Tor Lane; Selleck, Nicholls & Co., Ltd., builders, East Hill, St. Austell.

Potters Bar.—Houses (54); Eagle Construction Co., Ltd., Cranleigh Close, Sanderstead.

Preston.—First instalment of extensions to Harris College of Further Education (£642,830); county architect, County Offices, Fishergate Hill, Preston.

Rickmansworth.—Houses (68), North Orbital Road area; F. A. Smith, U.D.C. surveyor, Council Offices, High Street.

Romford.—Swimming pool, slipper and medical baths, stage, etc., as first instalment of new swimming baths scheme (£255,000); J. Twinn, town clerk, Town Hall.

Scawthorpe.—New junior/infants' school (£90,000); architect to the Don Valley Education Committee, Doncaster.

Sittingbourne.—Farm and agricultural institute (£386,000); E. T. Ashley Smith, county architect, Springfield, Maidstone.

Southampton. — Glen Eyre Secondary School for Girls; A. F. Myers & Partners, consulting engineers, 147, Victoria Street, London, S.W.1.

Southport.—Aged persons' hostel, Ainsdale area; borough architect.

South Shields.—Proposed infants' school, Whiteleas (£57,000); George Henderson, builder, East Boldon, Co. Durham.

Modernisation of Derby Street baths (£42,000); borough engineer.

Stockport.—Six-storey science block as phase 1 of extensions to Stockport College for Further Education, and erection of Goyt Bank Technical High School for Girls, Offerton; borough architect, Town Hall.

Stourbridge.—Works extensions for Lye Trading Co. (Shearers), Ltd.; British Industrial Engineering Co. (Staffs), Ltd., Hainge Road, Tividale, Tipton.

Strood.—Houses (150), Hoo estate; R.D.C. surveyor, Frindsbury Hill, Rochester, Kent.

Sunderland.—Development scheme at Seaburn, including cafeteria and additions to Seaburn Hall (£287,000); T. Donkin, borough engineer.

Swansea.—Flats (60), Terrace Road; borough architect.

Tonbridge.—New technical school for girls on site at Somerhill Park; E. T. Ashley Smith, county architect, Springfield, Maidstone.

Tunbridge Wells.—Block of offices in Church Road; National Employers' Mutual General Insurance Association, Ltd., Bury Street, London, E.C.3.

Wallasey.—Extensions to technical college; Ernest Griffiths & Son, consulting engineers, Kinders, Allport Road, Bromborough.

Wallsend.—Potato crisp factory, Willington Square, for Tudor Food Products, Ltd., Sandyford Road, Newcastle-on-Tyne.

Ware.—Secondary modern school at Musley Hill (£189,110); C. H. Aslin, county architect, County Hall, Hertford.

Warrington.—Chemical building for Joseph Crosfield & Sons, Ltd., Bank Quay Works; Matthew Hall & Co., Ltd., contractors, 26, Dorset Square, London, N.W.1.

Wednesbury.—Houses (104), Woods (Friar Park) estate; borough engineer, Town Hall.

West Lothian.—Technical college at Bathgate and primary schools on sites at Armadale and Uphall Station; J. Calder, county clerk, County Buildings, Linlithgow.

Whitley Bay.—New club premises at Collywell Bay Road for Waterford Workmen's Social Club (£35,000); J. M. Angus, architect, 3, Gallowgate, Newcastle-on-Tyne.

Whittlesey.—Junior mixed school for Isle of Ely County Council (£64,236); Rose & Sons, Ltd., Whittlesey, Cambs.

Wigan.—Extensions, Wigan and District Mining and Technical College; Grenfell Baines & Hargreaves, architects, 12, Guildhall Street, Preston.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) will be obtainable after 9th April from the Patent Office, 25, Southampton Buildings, London, W.C.2

1951

6443. Marconi's Wireless Telegraph Co., Ltd.—Signal indicating circuit arrangements. 13th November, 1951. (793240.)

1952

18823. General Electric Co., Ltd., and Kirkness, R. H.—Apparatus for the translation of co-ordinates from one system of co-ordinates to another. 29th July, 1953. (793170.)

1953

19955. Engel & Gibbs, Ltd.—Electric conducting liquid switches. 25th June, 1954. (793173.)

34567. Standard Telephones & Cables, Ltd.—Thyratron controlled rectifier power supply units. 3rd December, 1954. (793181.)

1954

13539. Vang, A.—Method for utilising electrical energy. 10th May, 1954. (792915.)

18705. English Electric Co., Ltd.—Electric circuit-breakers. 24th June, 1955. (793040.)

18730. British Thomson-Houston Co., Ltd.—Seals for electric discharge lamps. 8th June, 1955. (793041.)

20220. Electricité de France.—D.c. amplifiers. 9th July, 1954. (793186.)

20546. Rist, D. A. V.—Electric lamp fitting. 14th July, 1954. (792956.)

20549. Leece-Neville Co.—Electrical generating systems. 14th July, 1954. (793171.)

23621. General Electric Co., Ltd.—Electric circuit arrangements for operating from an a.c. supply one or more electric discharge lamps. 14th November, 1955. (Addition to 730024.) (793042.)

36200. Sylvania Electric Products, Inc.—Apparatus for exhausting electric discharge devices. 14th December, 1954. (793046.)

1955

401. Imperial Chemical Industries, Ltd.—Electrical indicating circuits. 4th January, 1956. (Cognate application 15941, 3rd June, 1955.) (793106.)

439. Permutit Co., Ltd.—Electrolytic apparatus. 23rd December, 1955. (Addition to 759275.) (792988.)

876. British Insulated Callender's Cables, Ltd.—Power factor testing gear for electric circuits. 11th January, 1956. (792989.)

3735. British Thomson-Houston Co., Ltd.—Radio frequency phase discriminator. 8th February, 1955. (792958.)

4786. Pye, Ltd.—Acoustic enclosure for loudspeakers. 17th February, 1956. (793193.)

5564. Parmeko, Ltd.—Electrical equipment for producing flashing lights. 8th February, 1956. (792916.)

12275. Garrett Corporation.—Electric analogue data computer. 28th April, 1955. (793109.)

12775. Rist, D. A. V.—Electric lamps. 14th July, 1954. (Divided out of 792956.) (792957.)

12867. Hatfield, R. H.—Electric transformers. 3rd August, 1956. (793051.)

12890. Electric & Musical Industries, Ltd.—Termination or attenuators for coaxial lines. 2nd May, 1956. (792918.)

14402. Nam, Y.—Electric signalling torches. 18th May, 1955. (792967.)

18067. Philips Electrical Industries, Ltd.—Methods of manufacturing an electrically conductive pattern on an insulating support. 22nd June, 1955. (792920.)

20024. British Thomson-Houston Co., Ltd.—Automatic tuning systems. 11th July, 1955. (792959.)

20188. Marconi's Wireless Telegraph Co., Ltd.—Radio distance measuring systems. 9th May, 1956. (793198.)

22470. Ultra Electric, Ltd.—Construction of submersible primary electric batteries. 27th July, 1956. (793061.)

25270. International Business Machines Corporation.—Electrical adding device. 2nd September, 1955. (793200.)

32355. General Electric Co.—High strength crystals. 11th November, 1955. (793071.)

32734. Walsall Conduits, Ltd.—Electrical socket connectors. 13th November, 1956. (Addition to 744915.) (793000.)

32787. Philips Electrical Industries, Ltd.—Non-reciprocal electromagnetic transmission systems. 16th November, 1955. (793164.)

33883. Engel & Gibbs, Ltd.—Electric conducting liquid switches. 25th June, 1954. (Divided out of 793173.) (793174.)

36732. General Electric Co.—Apparatus for detecting infra-red radiation. 22nd December, 1955. (793208.)

36913. Collins Radio Co.—Magnetic amplifier circuits. 23rd December, 1955. (793127.)

1956

62. British Thomson-Houston Co., Ltd.—Automatic programme control. 2nd January, 1957. (793128.)

1944. National Research Development Corporation.—Electronic shift registers. 18th January, 1957. (793131.)

8724. Busch-Jaeger Dürener Metallwerke Akt.-Ges.—Electrical cam switch. 20th March, 1956. (793080.)

9681. Herman, E. G.—Lighting fitting for a series of electric lamps particularly for table lighting. 28th March, 1956. (792935.)

10650. Standard Telephones & Cables, Ltd.—Electrical pulse signal translator. 6th April, 1956. (793167.)

12199. Barmer Maschinenfabrik Akt.-Ges.—Electrically driven spinning, twisting and winding machines. 20th April, 1956. (Addition to 770710.) (792937.)

12821. Chloride Electrical Storage Co., Ltd.—Lead-acid accumulators. 17th January, 1957. (793083.)

13163. General Controls Co.—Electrical control systems for fluid-pressure operated devices. 30th April, 1956. (793026.)

13592. Engel & Gibbs, Ltd.—Variable resistances. 25th June, 1954. (Divided out of 793173.) (793175.)

15969. Soc. Anon. de Machines Electrostatiques.—Electrostatic generators. 23rd May, 1956. (792940.)

17001. Philips Electrical Industries, Ltd.—Magnetic tape sound recording and reproducing apparatus. 1st June, 1956. (792942.)

17457. Detroit Controls Corporation.—Rotary jet electric switch. 6th June, 1956. (793148.)

17939. General Motors Corporation.—Motor compressor unit for refrigerators. 11th June, 1956. (793091.)

22052. Electric Storage Battery Co.—Vent plugs for electric storage batteries. 17th July, 1956. (793094.)

23454. Atomic Energy of Canada, Ltd.—Control of atomic power reactors. 30th July, 1956. (792972.)

27151. Ryba, A., Reinisch, J., and Vinatzer, E.—Slipring-less electromagnetically actuated coupling. 5th September, 1956. (792974.)

27764. General Electric Co.—Electric retractive switches. 11th September, 1956. (793155.)

30264. Leece-Neville Co.—Electrical generating systems. 14th July, 1954. (Divided out of 793171.) (793172.)

Amended Specification

750695. English Electric Co., Ltd.—Electrical protective relay devices.

Street Lighting Notes

Aberdeen Watch and Lighting Committee has approved a scheme, estimated to cost £3,945, for improving the lighting in Westburn Drive, Hilton Street and in Leslie Road.

Improved lighting of various main roads and bus routes in **Bolton** is proposed and loan sanction is sought for £12,085.

Kensington Borough Council has decided to proceed with Stage 1 of its street lighting improvement scheme. It is proposed to accept the tender of the General Electric Co., Ltd., amounting to £29,066, for the supply of the fluorescent lanterns and the erection of lanterns and columns, the columns to be supplied by Concrete Utilities, Ltd. The total cost of carrying out the scheme amounts to £79,402.

Poole Corporation is to seek sanction to borrow £10,420 for improving the lighting of main roads.

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are pleased to announce that they have

been awarded contracts for supplying

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HUNTERSTON

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The English Electric Co. Ltd.
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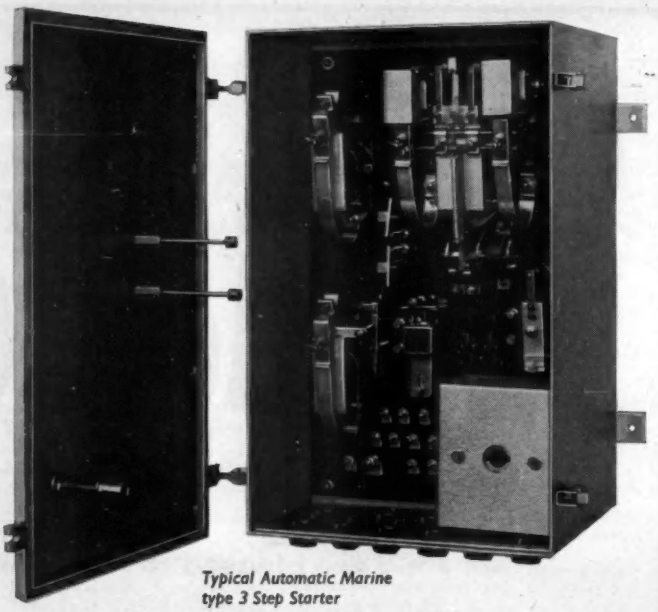

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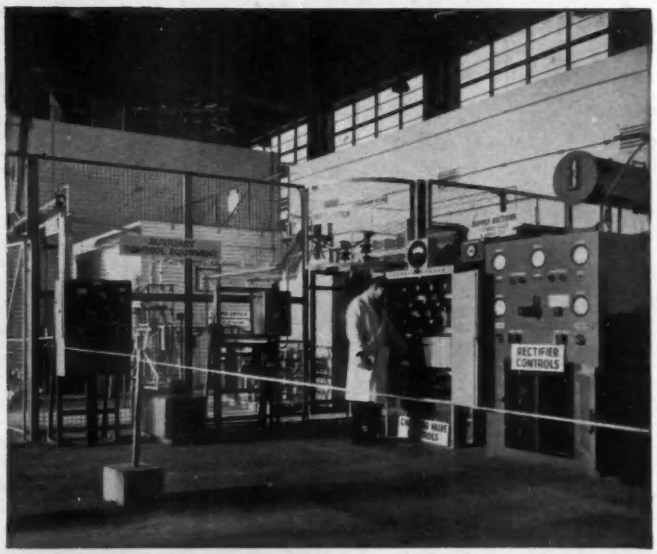
Power FOR Zeta

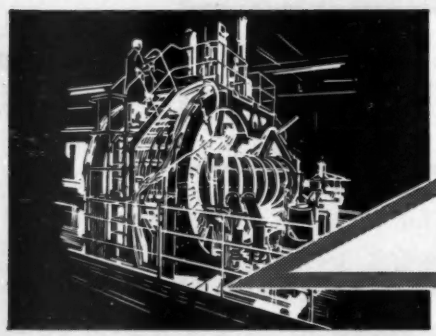


Standard Telephones and Cables Limited offer their congratulations to the U.K.A.E. physicists and engineers on the successful completion of their initial researches into controlled thermonuclear reaction. In the design and supply of the 26kV D.C. Power Plant used to start nuclear fusion, S.T.C. engineers were proud to be associated with this venture.

ZETA POWER PLANT, HARWELL. S.T.C. Equipment included the control cubicle on the right and the oil-immersed rectifier equipment behind the open cubicle. The Rectifier Division also supplied the 24kV H.T. Transformer and Supply Regulating Transformer. SenTerCel *selenium rectifiers are used in the saturable reactor.*

The 26kV 4A SenTerCet *Rectifier Equipment being loaded at the S.T.C. Rectifier Division factory for transit to Harwell.*

THE ZETA TORUS. Power from the SenTerCet *equipment is discharged via condensers into the primary of the pulse transformer. The ionized deuterium gas in the inner tube forms the secondary of the transformer. Current of the order of 200 000 amperes is induced to start nuclear fusion.*



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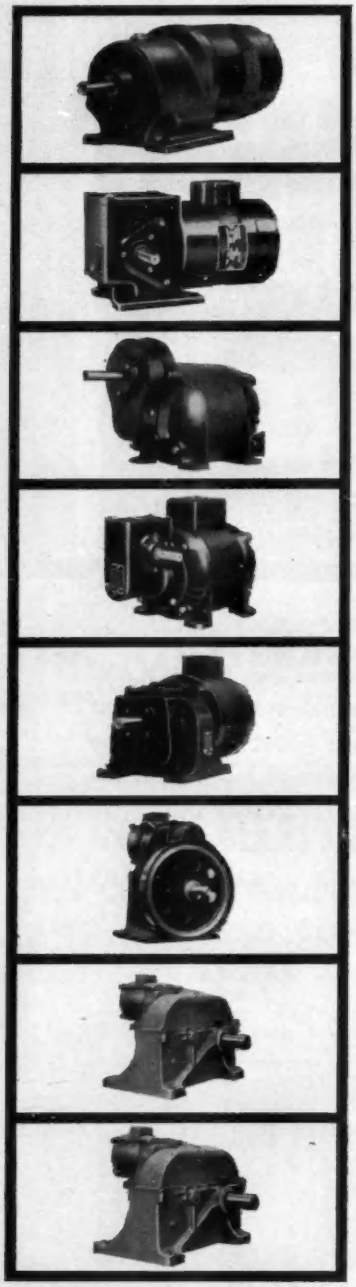

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312–0.079 r.p.m.

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$\frac{1}{4}$ to $\frac{1}{2}$ H.P.
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200
200 lb.-ft.
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800 lb.-ft.
12.75–0.47 r.p.m.

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1500 lb.-ft.
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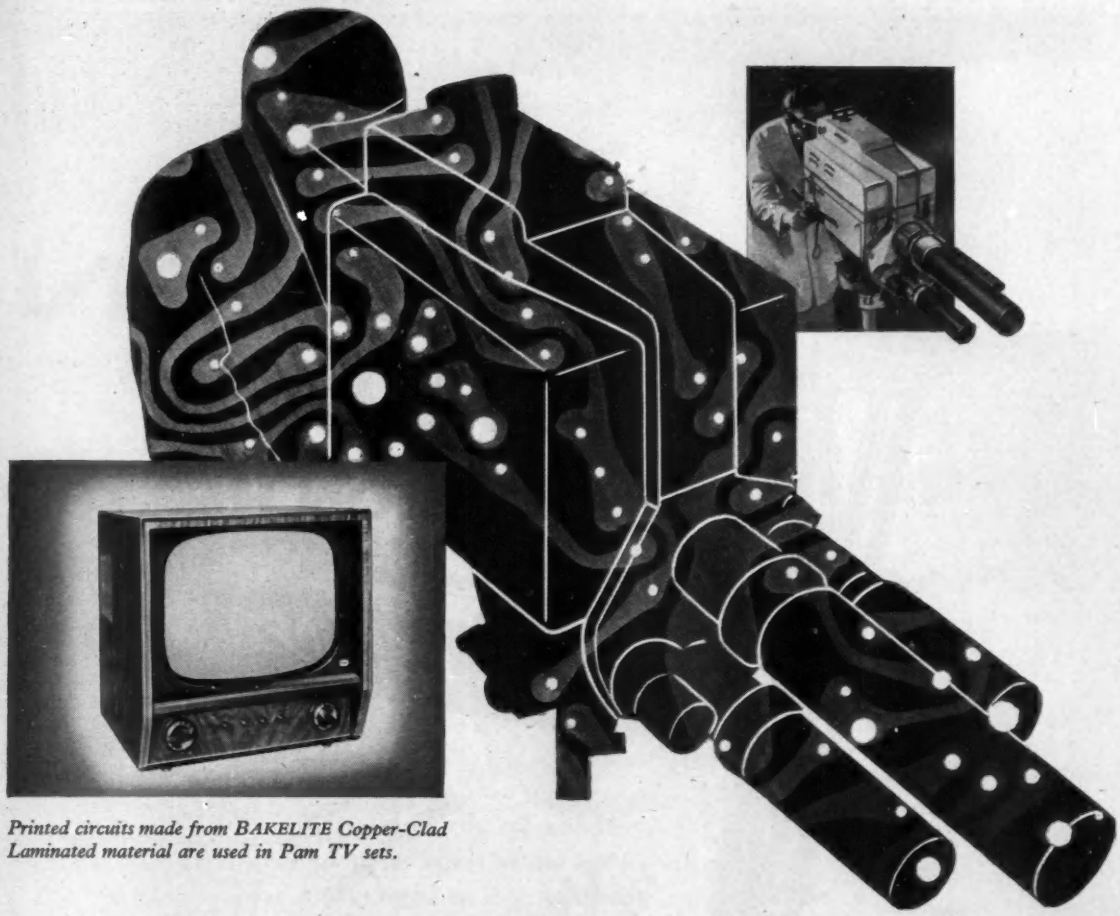

Printed circuits made from BAKELITE Copper-Clad Laminated material are used in Pam TV sets.

DRAMATIC PRODUCTION IN VIEW—

with BAKELITE Copper-Clad Laminated

TRADE MARK

Extensive use of printed circuits from BAKELITE Copper-Clad Laminated material has brought a greater efficiency into the production of television sets. The simplicity and accuracy of assembly, which are features of this technique, speed up output by as much as 300%. All soldering is done in one operation, and with less likelihood of bad connections or wrong wiring, testing is minimised and the reliability of the finished instrument considerably increased.

Today printed circuits on BAKELITE Copper-Clad Laminated Materials, either rigid or flexible, are finding new applications throughout the Radio and Electronics industries. They allow more freedom and precision to the designer, reduce production time and costs for the manufacturer, and give the customer a lighter, more compact and reliable instrument.

Write today for a copy of "Copper-Clad BAKELITE Laminated for Printed Circuits".

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Bakelite Limited manufacture an extensive range of plastics materials and maintain a technical service unequalled in the industry. No matter what your plastics problems, this service is at your disposal. SLOane 0898 is the telephone number.

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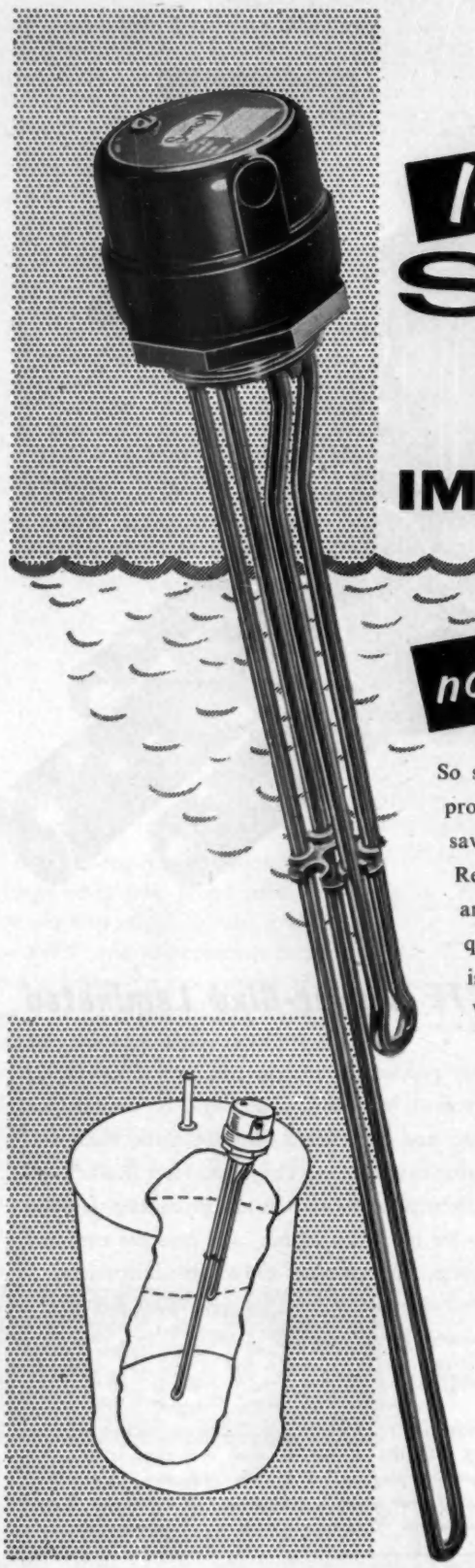

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SANTON 'DUAL'

IMMERSION HEATER

now at a REDUCED PRICE

So successful has been the 'DUAL' Immersion Heater that production has now reached a point where substantial savings can be passed on to our customers.

Remember it is no larger, and is as easy to install as an ordinary immersion heater — yet it heats a limited quantity of water as fast as a vertical heater and is as efficient as a horizontal heater for bulk supplies.

When used with the special Santon Dual control unit both heaters cannot be on at the same time, and the housewife cannot heat too much water to too high a temperature at the 'sink' position through forgetfulness.

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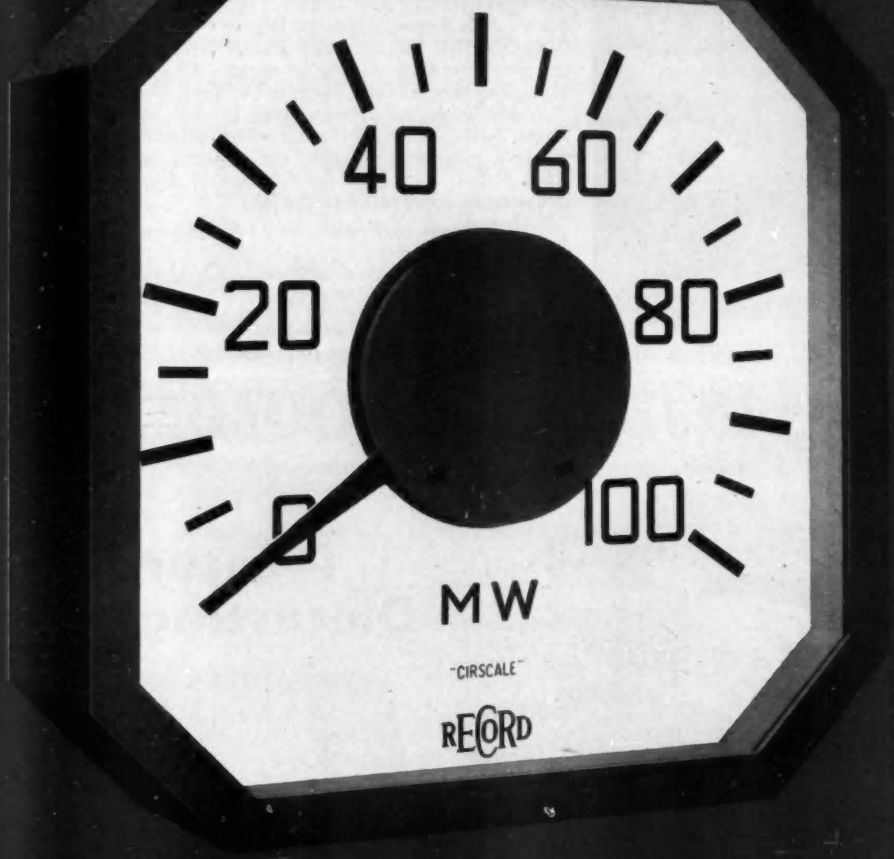

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With a scale length of 5 feet, bold figures and internal illumination, this instrument can be read accurately at considerable distances. It complies fully with BSS 89 1954 and combines ample power with high sensitivity. It is suitable for indicating Amps, Milliamps, Volts, R.P.M. or Frequency, or any value which may be converted into one of these. Single or double sided models available

by RECORD

THE RECORD ELECTRICAL CO. LTD. 'CIRSCALE' WORKS BROADHEATH ALTRINCHAM CHESHIRE

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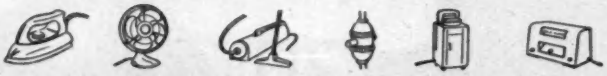
NYLON STRAIN RELIEF BUSHINGS

(FULLY PATENTED)

Since their introduction to Britain from the U.S.A. I.M. NYLON STRAIN RELIEF BUSHINGS are being used by an ever-increasing variety of trades—Clocks, Radios, T/V., Fans, Toasters, Mixers, Vacuum Cleaners, Washing Machines, Portable Tools, Air Conditioners, Electric Mowers, Clippers, Drills, Saws, etc. They are rapidly becoming "Standard" where a positive, insulating, non-slip grip is essential. Made from Nylon, they grip tightly without nipping and give a streamlined appearance to the job.

Some typical applications of I.M. Nylon Bushings



Easily applied—place Bushing on wire, push into hole—that's all!

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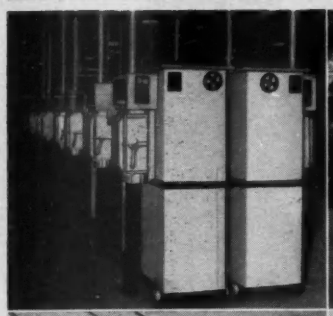

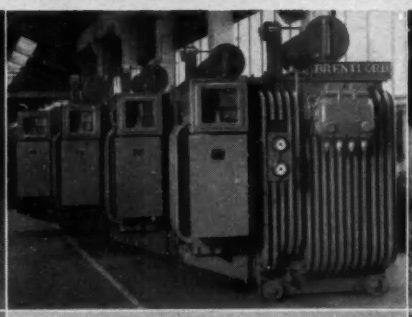

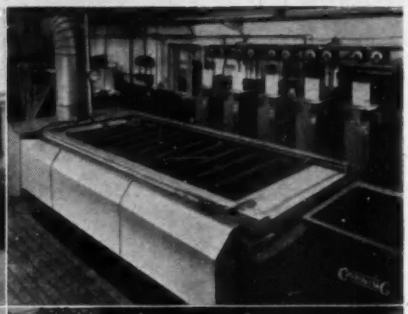

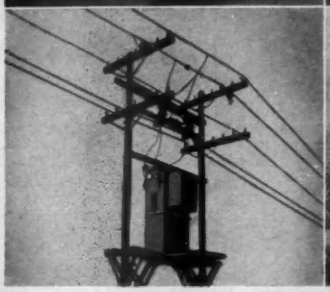

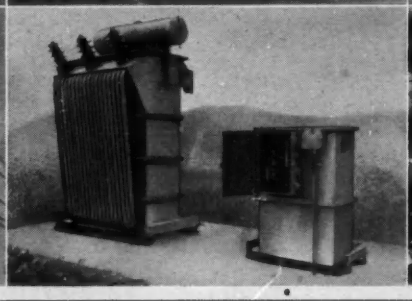

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For systems carrying a mixed industrial and domestic load and for the control of long, heavily loaded lines, Brentford Regulators are used throughout the world.

Radio, Television, Radar

Undistorted waveform output makes Brentford Regulators ideal for operation with sensitive plant. Used in all B.B.C. television and radio stations.

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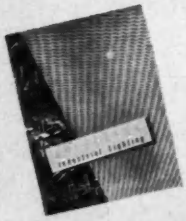
A TYPICAL ERAMEPROOF UNIT



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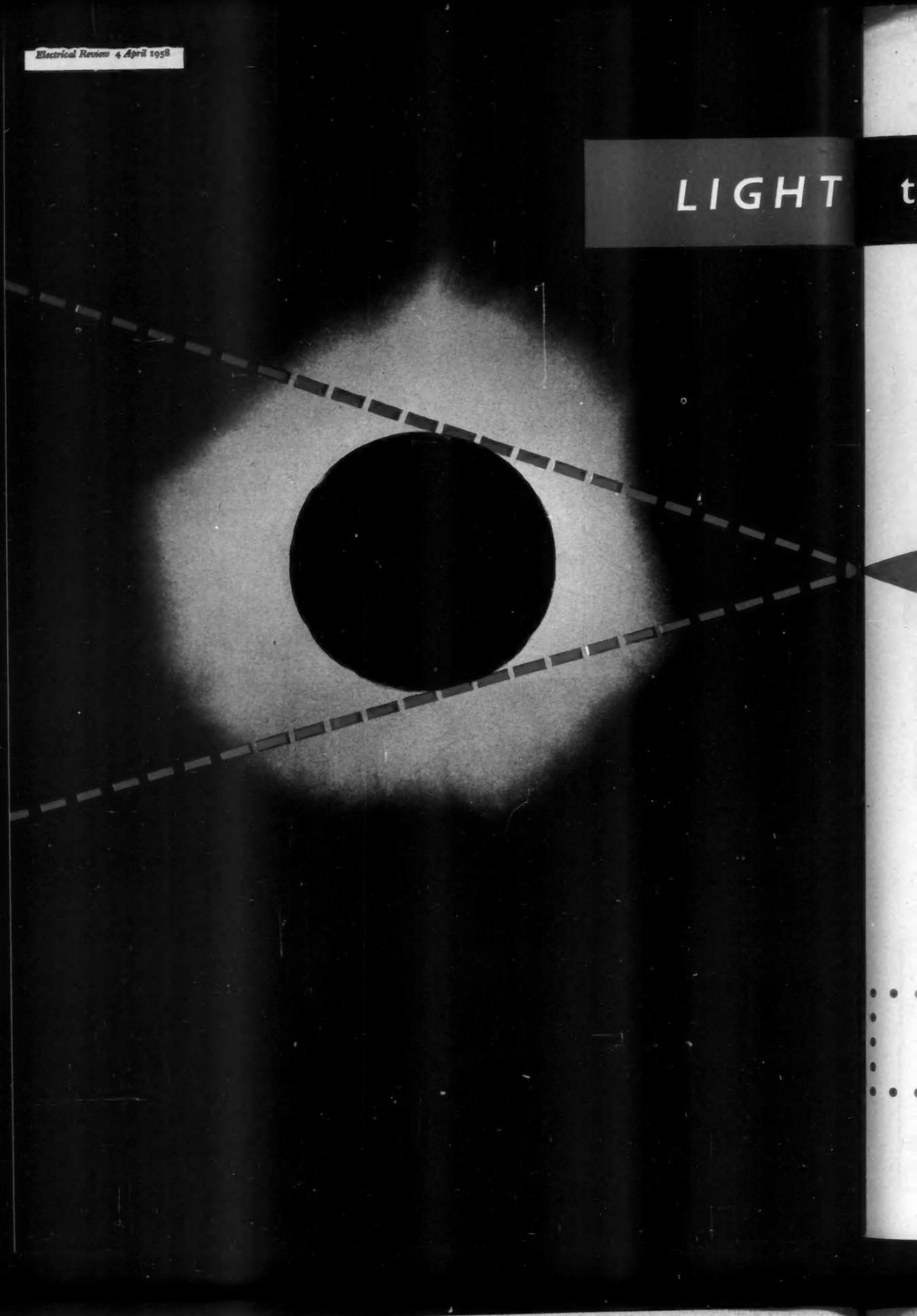
Electrical Review 4 April 1958



SOLAR CORONA
Solar observations come within the scope of the work of scientists of more than 50 nations throughout the International Geophysical Year. Photograph by courtesy of the Hamburg Observatory

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One side of the picture—
the sun: hub of the solar system. A light that always burns

And the other side? Simplex lighting fittings
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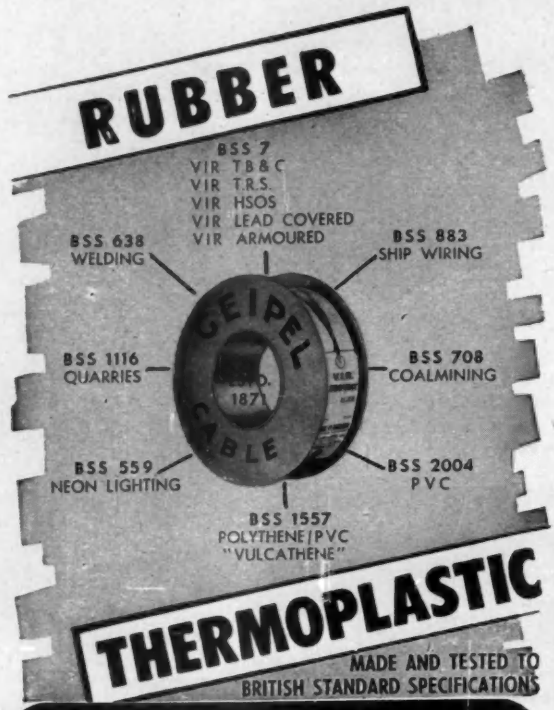

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Elements: High-grade Nickel Chrome. Black Heat, easily replaceable.
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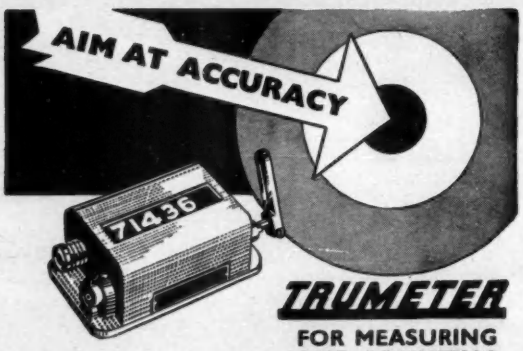

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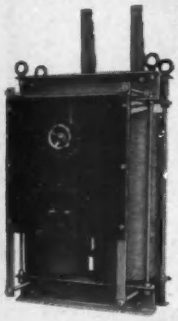
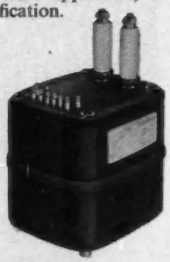


The illustration is of a 60 KVA Transformer with a 5,000 amp. Secondary, with tapped Primary to give secondary voltage variation from 12 volts to 4 volts. Primary tap changes are made with a rotary switch as shown. These Units are designed and tested to BSS 171 where applicable, or appropriate B.S. Specification.



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★ Wellglass and guard.
★ Cable gland.
★ Uses 25 watt. standard tubular lamp.

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Available in all types, both normal and miniature

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HYDE FOOT-OPERATED WIRE STRIPPER

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HYDE E-Z WIRE STRIPPER

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Stripping without teasing

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GOLIATH holders can be relied upon to give years of trouble-free service.
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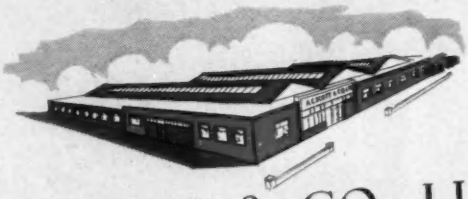

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In order to meet the ever-growing demand for these Products, we have built, and are now installed in new and completely up-to-date Factory Premises at the above address.

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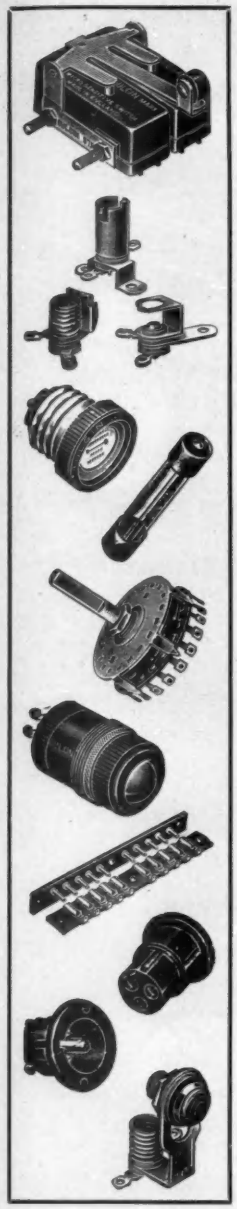

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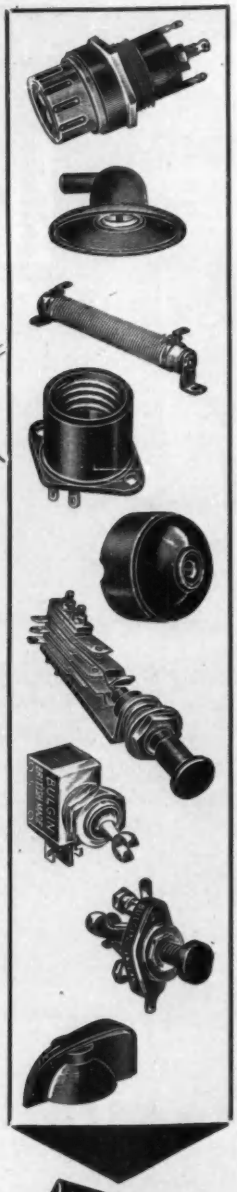

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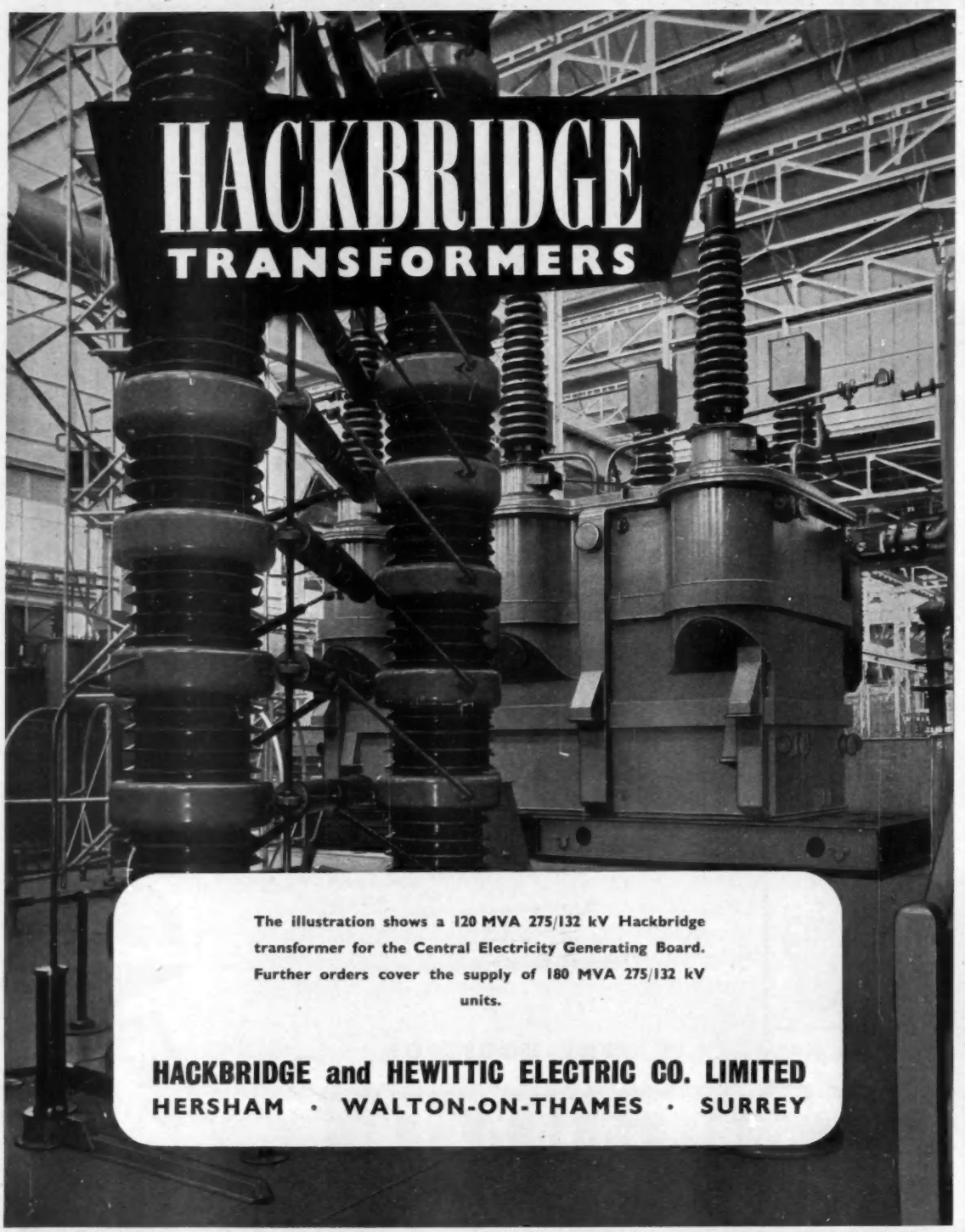

The illustration shows a 120 MVA 275/132 kV Hackbridge transformer for the Central Electricity Generating Board. Further orders cover the supply of 180 MVA 275/132 kV units.

HACKBRIDGE and HEWITTIC ELECTRIC CO. LIMITED

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OVERSEAS REPRESENTATIVES: ARGENTINA: H. A. Roberts & Cia., S.R.L., Buenos Aires. **AUSTRALIA:** Hackbridge and Hewittic Electric Co. Ltd., 171 Fitzroy Street, St. Kilda, Victoria; N.S.W., Queensland, W. Australia: Elder Smith & Co. Ltd.; South Australia: Parsons & Robertson Ltd.; Tasmania: H. M. Bamford & Sons (Pty.) Ltd., Hobart. **BELGIUM & LUXEMBOURG:** M. Dorfman, 5 Avenue des Phalenes, Brussels. **BRAZIL:** Oscar G. Mors, Sao Paulo. **BURMA:** Neonlite Manufacturing & Trading Co. Ltd., Rangoon. **CANADA:** Hackbridge and Hewittic Electric Co. of Canada Ltd., Montreal; The Northern Electric Co. Ltd., Montreal, etc. **CEYLON:** Envee Ess Ltd., Colombo. **CHILE:** Sociedad Importadora del Pacifico Ltda., Santiago. **EAST AFRICA:** Gerald Hoe (Lighting) Ltd., Nairobi. **EGYPT:** Giacomo Cohenca Fils, S.A.E., Cairo. **FINLAND:** Sähkö-ja Koneliike O.Y. Hermes, Helsinki. **GHANA, NIGERIA & SIERRA LEONE:** Glyndova Ltd. **NETHERLANDS:** J. Kater, E.I. Ouderkerk a.d. Amstel, Amsteldijk Noord 103c. **INDIA:** Steam & Mining Equipment (India) Private Ltd., Calcutta; Easun Engineering Co. Ltd., Madras 1. **IRAQ:** J. P. Bahoshy Bros., Baghdad. **MALAYA, SINGAPORE & BORNEO:** Harper, Gilfillan & Co. Ltd., Kuala Lumpur. **NEW ZEALAND:** Richardson, McCabe & Co. Ltd., Wellington, etc. **SOUTH AFRICA:** Arthur Trevor Williams (Pty.) Ltd., Johannesburg, etc. **CENTRAL AFRICAN FEDERATION:** Arthur Trevor Williams (Pty.) Ltd., Salisbury. **THAILAND:** Vichien Phanich Co. Ltd., Bangkok. **TRINIDAD & TOBAGO:** Thomas Peake & Co., Port of Spain. **TURKEY:** Dr. H. Salim öker Ankara. **U.S.A.:** Hackbridge and Hewittic Electric Co. Ltd., P.O. Box 234, Pittsburgh 30, Pennsylvania. **VENEZUELA:** Oficina de Ingenieria Sociedad Anonima, Caracas.

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EXCESSIVE VOLTAGE VARIATIONS ON A.C. SUPPLY SYSTEMS

All types accurate to ± 1%
Self-contained for simple installation
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Send details of your voltage problems to the Voltage Regulator specialists:—

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A complete range of wet and dry scrubbers and polishers, mains or battery operated, to tackle anything from a garage floor to a dance floor.

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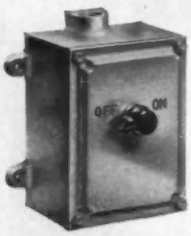

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with RELIABILITY in mind...

but with an eye on costs

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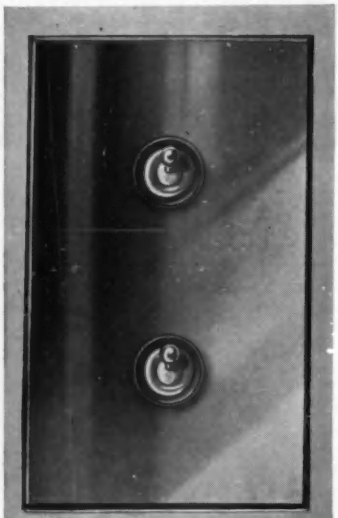
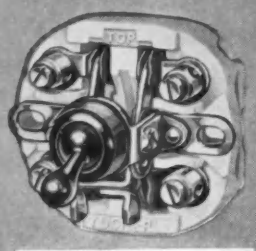
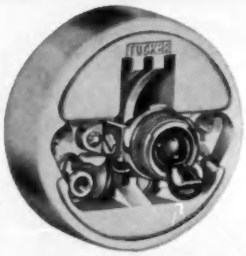


5 amp., 2 gang 'Tyne' range flush switches.

For heavy duty the quick make and break AC/DC 'TYNE' RANGE



5 amp. Double Pole, Metal Dolly, 'Tyne' flush switch.



Open view of surface type switch, 5 amp., 'Tyne' range.

Semi-recessed switch of the 'Tyne' range.

- The MEM 'Tyne' range offers quick make and break AC/DC heavy duty switches with complete positive action.
- All switches in the range have high grade vitreous porcelain bases.
- Tyne switches are an excellent choice for heavy duty installations such as in factories, institutions and public buildings.
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Send for your copy of the MEM-Tucker-Kerson catalogue No. 370 – Britain's most complete accessories list.

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M101

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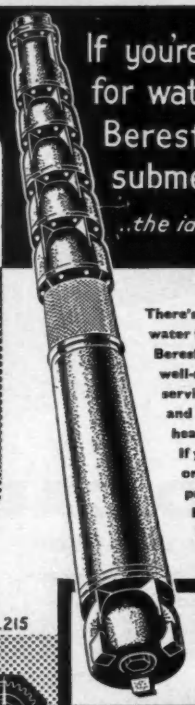
If you're in a hole for water-install a Beresford submersible pump...
...the ideal borehole pump



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CUBICLE CONTROL GEAR FOR SERVICE IN ANY CLIMATE

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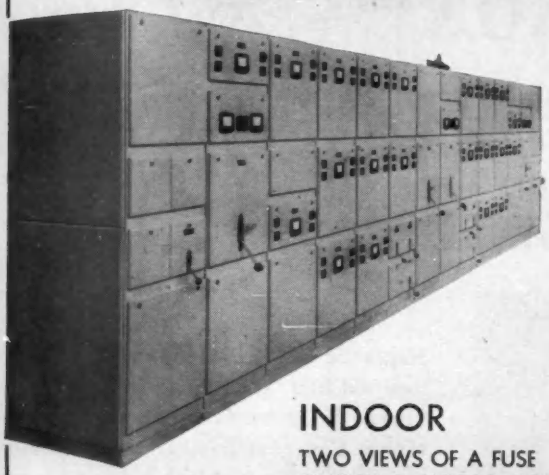
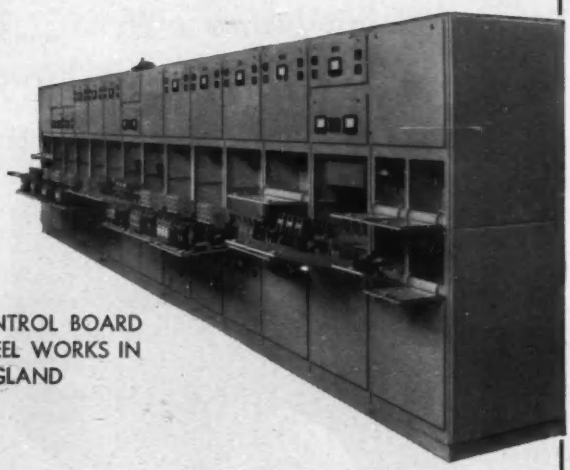
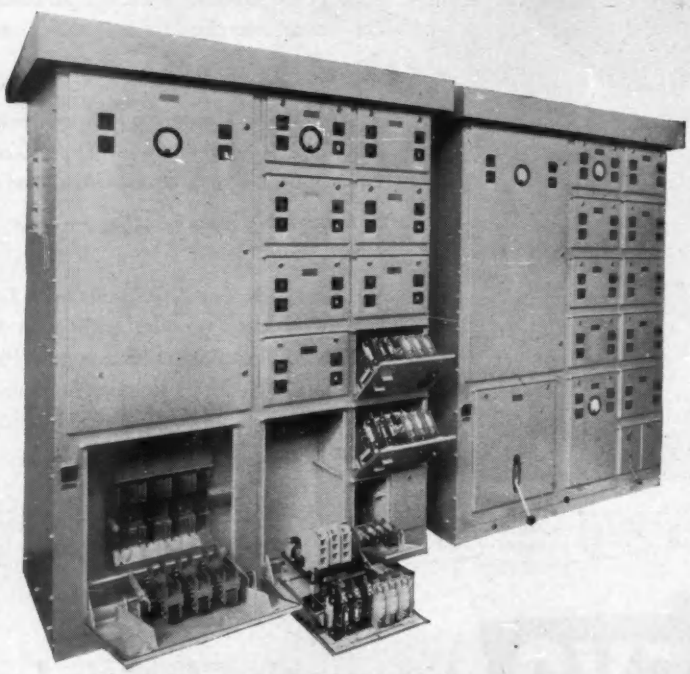




INDOOR

TWO VIEWS OF A FUSE SWITCH & MOTOR CONTROL BOARD FOR AN IMPORTANT STEEL WORKS IN THE NORTH EAST OF ENGLAND



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- ★ Complete accessibility to all Starters and Switches
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won't do for her . . .

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★ *Available in Chromium plate or colours in Porcelain or Art enamel—Citron Yellow, Dresden Blue, Willow Green, Guardsman Red.*

★ *Remarkably quick-heating — stays hot longer, too!*

Weight 4½ lbs. For A.C. Mains only. Loading 650 watts. Complete with non-kink flexible cable. Prices: Chromium Plated 45/- plus 9/11 P.T. Colours in Porcelain Enamel 47/6 plus 10/5 P.T. Colours in Art Enamel 39/6 plus 8/7 P.T.

Choose right-choose **REVO** REGD. ***Automatic Electric Iron***

Write for details of any of the above appliances to:

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Say, is this some kind of a joke!

It could even happen—and uncertainty is never funny. No need for long faces, however, even on Long Island. In a doubting world there are some things that can be relied upon. Industry certainly relies on the 5 kVA to 4000 kVA capacity transformers made by Lindley Thompson.

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TRANSFORMER AND SERVICE CO., LTD.

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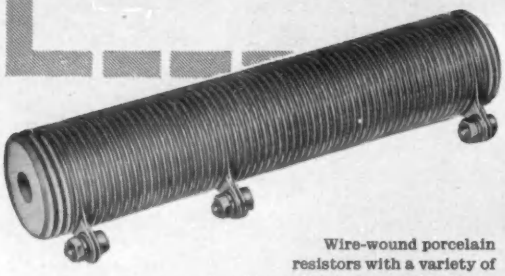
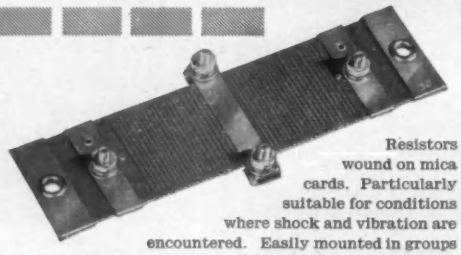
WIRE WOUND RESISTORS



Wire-wound porcelain resistors with a variety of mountings. Mainly for small loadings where close tolerance and electrical stability are needed.



Resistors wound on mica cards. Particularly suitable for conditions where shock and vibration are encountered. Easily mounted in groups for high wattage dissipation.

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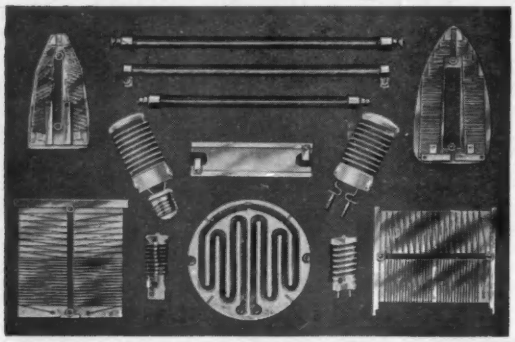
dependable ELEMENTS

for every job

Stocked by Leading Wholesalers



THE

ELECTRIC ELEMENTS CO.

Tokenhouse Yard, Nottingham

Makers of Elements since 1921

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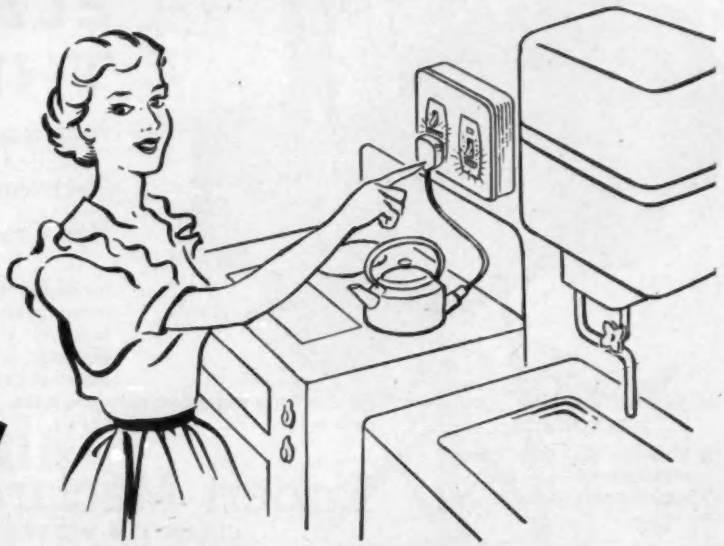
Control Units and Isolating Switches

INSULATED COVER
With or without Pilot Light

METAL CLAD
With or without Pilot Light

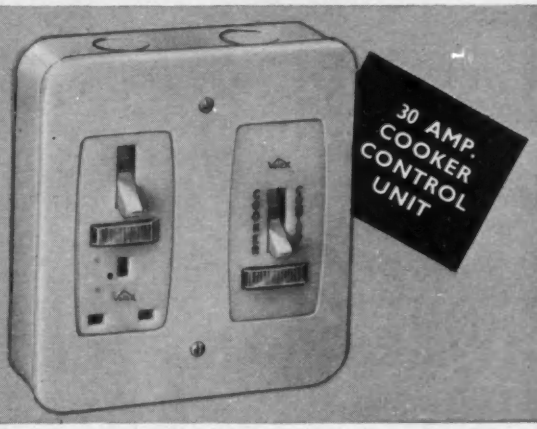


It is impossible to detail here the vast range of these extremely adaptable 30 amp. D.P. Isolating Switches and Control Units. We therefore invite you to send for our illustrated leaflet giving full particulars of complete range and prices.

Insulated cover types are available in Cream or Brown finish and metal clad types, either flush or surface mounting in attractive Cream stove enamel finish with optional alternatives of satin chrome plates.

Available from your usual wholesale suppliers.

METAL CLAD
With 13 amp. 3 pin Sub-circuit.
With or without Pilot Light.



METAL CLAD
With 13 amp. 3 pin Switched Socket Outlet.
With or without Pilot Light.

VOLEX ELECTRICAL PRODUCTS LTD.
SALFORD 6

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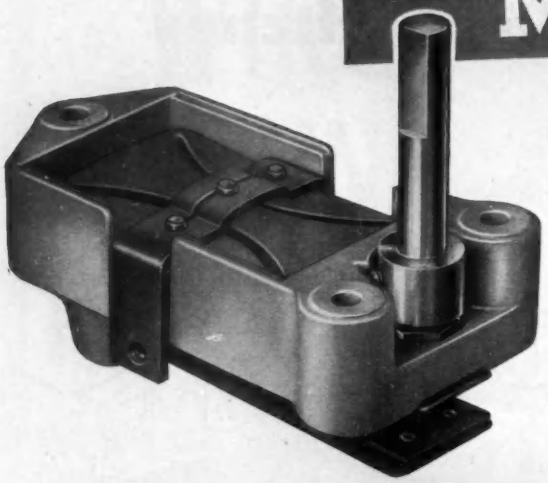

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TYPE MC. FOR USE WITH

Electrical Convector Heaters,

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Intended for incorporation in such equipment and consequently not enclosed in a box of its own. So designed that the bimetal is not affected by any heating of current-carrying parts. Robustly constructed on a strong moulded ceramic base, with the switch mechanism fully protected. Rating: 15 amps at 250 v. 50 cycles or 0·1 amp, 250 v. D.C.

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THERMOSTATS
for Electricity, Gas, Oil or Steam
PRESSURE REGULATORS
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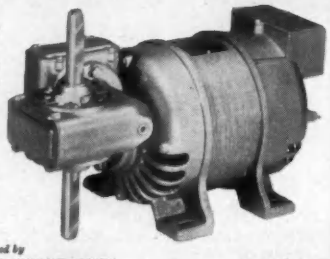
Including Universal, Permanent Capacitor, Induction, Synchronous, Shaded Pole and Split Phase types. These motors are also available with Single or Double Reduction Worm Gear Boxes, with a range of speeds from ¼ r.p.m. up to 840 r.p.m.

Our latest catalogue available on request.

Illustration shows Parvalux S.D.20 Double Reduction Worm Gear Unit with Split Phase Induction motor. 1/8 h.p. with a range of final speeds from 0.2 to 19 r.p.m.



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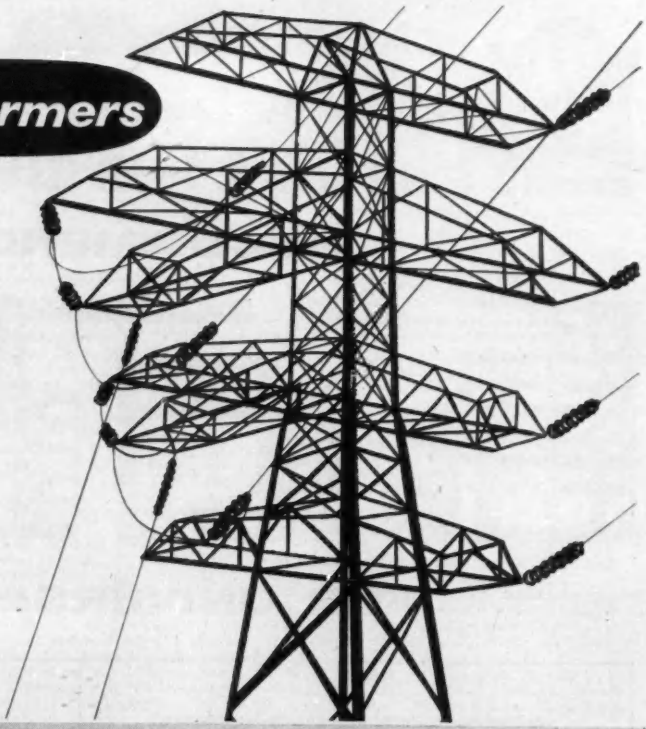

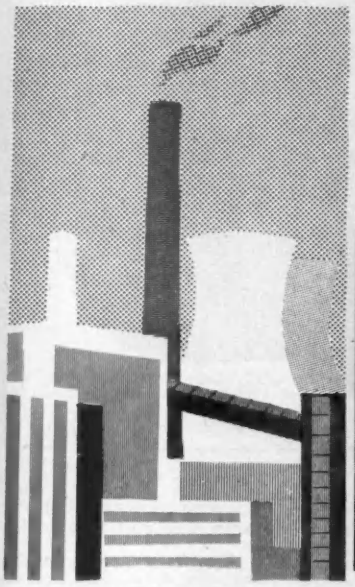

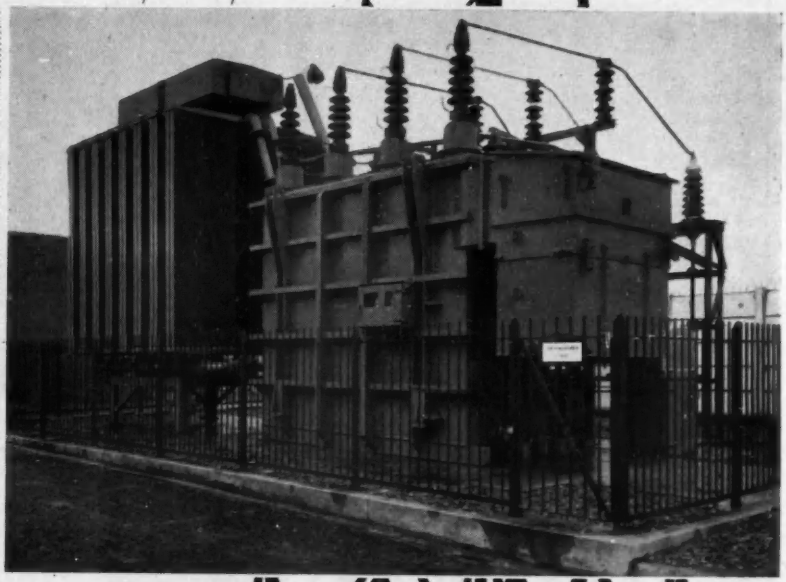

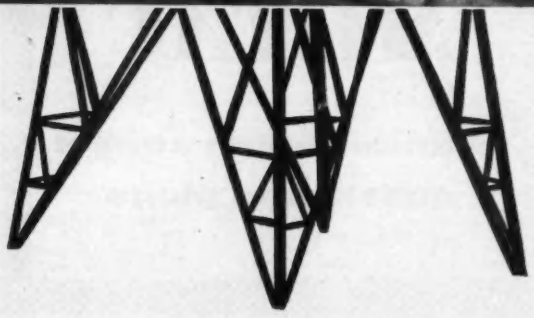

YORKSHIRE ELECTRIC TRANSFORMER CO. LTD.
THORNHILL, DEWSBURY, YORKS., ENGLAND
Tel: Dewsbury 1691-2 Grams: Transforma, Dewsbury

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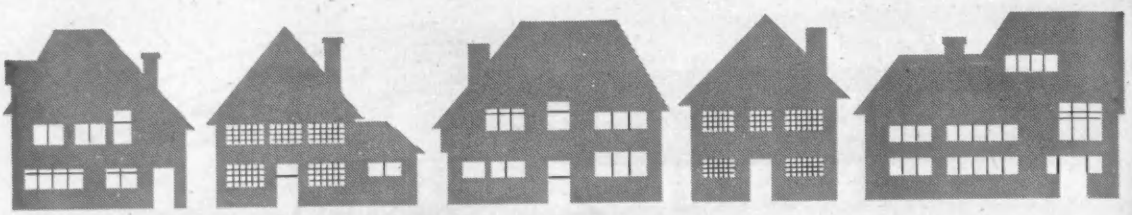
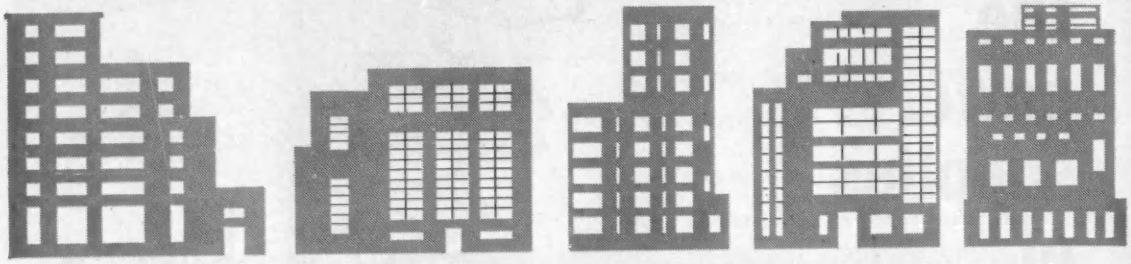


RECOMMENDED . . .



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13 amp. switch socket outlets and plugs

The G.E.C. range of 13 amp. 250 volt accessories for ring circuits now offers a selection of 22 socket outlets and switch-socket outlets and plugs, suitable for domestic and commercial installations.

G.E.C. products

For full particulars of this comprehensive range, please send for publication 3961.

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COUNTY BOROUGH OF BRIGHTON

Water Department

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Conditions of contract, form of tender, specification and drawing obtainable from Water Department, 12, Bond Street, Brighton, 1. Deposit of £2 2s. will be refunded on receipt of a bona fide tender and return of documents supplied.

Tenders (in duplicate) enclosed in plain sealed envelope, not bearing any name or mark indicating the sender, and endorsed "Tender for Balsdean Switchgear," to be delivered to me before Saturday, 3rd May, 1958.

The Corporation do not bind themselves to accept the lowest or any tender.

W. O. DODD,
Town Clerk.

Town Hall,
Brighton, 1.
19th March, 1958. 2914

CITY OF PETERBOROUGH

THE Council invites tenders from recognised Electrical Contractors for the Electric Lighting and Power Installations to 116 Permanent Houses and 24 Flats at Gunthorpe Estate, Peterborough. Drawings, specifications and forms of tender may be obtained on application to Mr. L. H. Robjohn, M.B.E., A.M.I.C.E., A.M.I.Mun.E., City Engineer and Surveyor, Town Hall, Peterborough.

Applications must be received before noon on Tuesday, 8th April, 1958, and must be accompanied by a cheque for two guineas, made payable to the Peterborough City Council. This deposit will be returned on receipt of a bona fide tender or by the return of the documents.

The tender documents to be returned by 12 noon on Tuesday, 15th April, 1958.

C. PETER CLARKE,
Town Clerk.

Town Hall,
Peterborough. 2972

INDIA STORE DEPARTMENT

DIRECTOR General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for large quantities of the following types of Cable :—

Items.	
1-32A.	Railway Signalling Cables.
33-37.	Polythene Insulated Polyvinyl.
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43-46.	V.I.R. Cables.
47-49.	P.I.L.C. Cables.

Tenders may be obtained from the above address at a cost of 15s. each (not refundable), quoting Ref. S. 5278/57CDN/FD.

Offers are to be received in New Delhi by 13.00 hours on 9th May, 1958. 2983

COUNTY BOROUGH OF HUDDERSFIELD

Huddersfield College of Technology

Provision of Lifts

APPLICATIONS are invited from firms wishing to be considered for inclusion in a panel of manufacturers to be invited to tender for the installation of two Passenger and one Goods Lifts at the above College.

Applications should be submitted to the undersigned not later than the 28th April, 1958.

H. GRAY,
Chief Education Officer.

Education Offices,
36, Ramsden Street,
Huddersfield. 2939

SITUATIONS VACANT

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS are invited for the following superannuable posts. N.J.B. Agreement conditions of service, Schedule A salary. Qualifications entitling to (a) Graduate or (b) Corporate Membership of I.E.E. or I.Mech.E. an advantage.

(b) DEPUTY POWER STATION SUPERINTENDENT,
BATTERSEA POWER STATION
(Vacancy No. 58/224).

Candidates should have had a responsible position in operation and maintenance of large modern high-pressure power station plant. Successful applicant will be responsible to the Station Superintendent for all aspects of work in the station and must possess proven ability in modern methods of personnel management.

Salary Class L, Grade 3, £1,745 per annum.

(b) SHIFT CHARGE ENGINEER,
BRUNSWICK WHARF
POWER STATION
(Vacancy No. 58/225).

Sound training in electrical and mechanical engineering with experience of modern high-pressure generating plant, preferably P.F. fired. Character and ability to supervise staff is important.

Salary Class K, Grade 7, £1,210 plus £116 shift per annum.

(a) ASSISTANT ENGINEER
(Efficiency and Testing),
FULHAM POWER STATION
(Vacancy No. 58/226).

To assist in station testing, efficiency, investigations and performance returns. Minimum qualifications O.N.C. (Elec. or Mech.).

Salary Class K, Class 14, £780 per annum.

(a) ASSISTANT ENGINEER (Control),
HACKNEY POWER STATION
(Vacancy No. 58/227).

To undertake control room duties in "A" Station with responsibility for synchronising load control and necessary switching operations.

Salary Class H, Grade 12, £780 plus £74 shift per annum.

Applications, quoting vacancy number to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 14th April, 1958. 2961

JOSEPH LUCAS (ELECTRICAL) LTD.

ASSISTANT ELECTRICAL
DESIGN ENGINEER

required for the design of rotating electrical equipment. Candidates should have Higher National Certificate, preferably some works training, and drawing office and design experience with small A.C. and D.C. machines. The position covers work on a wide range of machines, carries a good starting salary, and provides excellent prospects for advancement.

Five-day week. Staff pension fund.

Apply, in writing, giving details of age, qualifications and experience, to the Personnel Manager, Joseph Lucas (Electrical) Limited, Great King Street, Birmingham, 19, quoting reference PM/D/208.

127

EASTER

ADVERTISEMENTS for the issue of 11th April have now closed for press.

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Essex Sub-Area

CHELMSFORD DISTRICT :
FOURTH ASSISTANT ENGINEER
(32/58.R).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, including substations.

Salary N.J.B. Class F, Grade 11 (£685-£730).

Apply by letter, within fourteen days, to D. H. Walker, A.M.I.E.E., District Manager, Eastern Electricity Board, Anchor Street, Chelmsford, Essex.

Northmet Sub-Area

SUB-AREA HEADQUARTERS,
LONDON, N.14 :
TWO ENGINEERING
DRAUGHTSMEN (33/58.R)
(Ref. 759A and 759B).

Candidates for post 759A should have had experience in the preparation of plans for system extensions and preferably also in overhead line design and surveying.

Candidates for post 759B should be experienced in the layout of switchgear, transformers and associated equipment for outdoor and indoor type substations up to 33 kV.

Salary for each appointment: N.J.B. Schedule D, Grade 6 (£595-£715) plus London allowance.

Apply by letter to W. M. Maynard, M.I.E.E., Deputy Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14, by 18th April, 1958. 2973

CHIEF ELECTRICAL DESIGNER

CROMPTON PARKINSON
(DONCASTER) LTD.

invite applications for the post of CHIEF ELECTRICAL DESIGNER for F.H.P. motors.

The company want a man with initiative and imagination, having a degree or a good Higher National Diploma or Certificate with endorsements for membership of the I.E.E.

The work will consist mainly of the electrical design of new ranges of A.C. and D.C. motors, and practical experience in this field is essential.

A generous salary is offered, commensurate with the post advertised and the qualifications and experience of the successful candidate.

Conditions of employment are excellent; the company operates a superannuation scheme, and financial assistance towards removal and housing will be considered in appropriate cases.

Write in confidence to Personnel Officer, Crompton Parkinson (Doncaster) Ltd., Wheatley, Doncaster, giving full details.

2893

***Situations Vacant** (continued)*

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division :—

ASSISTANT SHIFT CHARGE ENGINEERS,
LINCOLN POWER STATION
(Vacancy No. 50/58/ER).

Applicants should have had a sound technical training and experience in a modern power station, and preference will be given to candidates who possess the Higher National Certificate or its equivalent.

The salary will be in accordance with Class F, Grade 9 (£790-£835 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 9th April, 1958.

ASSISTANT MAINTENANCE ENGINEER (Mechanical),
SPONDON POWER STATION
(Vacancy No. 53/58/ER).

Applicants should have received a sound technical training and wide practical experience in the maintenance of power station mechanical plant, particularly turbo-alternators, and must be capable of planning and supervising mechanical plant maintenance.

Preference will be given to candidates who are corporate members of an appropriate professional institution or hold qualifications leading to such membership.

The salary will be in accordance with Class H, Grade 9 (£885-£930 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 9th April, 1958.

SHIFT CONTROL ENGINEER,
WILLINGTON "A" POWER STATION
(Vacancy No. 54/58/ER).

Applicants should have had a good general education and technical training with practical experience in the control and operation of large modern switchgear. Preference will be given to candidates who possess technical qualifications to Higher National standard.

The salary will be in accordance with Class K, Grade 10 (£935-£995 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 9th April, 1958.

GENERAL ASSISTANT ENGINEER,
AVON POWER STATION, WARWICK
(Vacancy No. 38/58/ER).

A General Assistant Engineer will be required at Avon Power Station, Warwick, where the suitable applicant will be given the opportunity to obtain operating and maintenance experience at this power station.

Applicants should be in possession of suitable engineering qualifications.

Salary will be within the range £540-£635 per annum, in accordance with the National Joint Board Agreement.

Closing date for receipt of applications, 16th April, 1958.

SECOND ASSISTANT ENGINEER (Electrical),
GENERATION (Construction) DEPT.,
SPONDON "H" POWER STATION
SITE (Vacancy No. 44/58/ER).

Preference will be given to applicants who hold a degree in Electrical Engineering, are Corporate Members of the Institution of Electrical Engineers, or possess other equivalent qualifications. They should have had experience in the design and installation of switchgear, transformers and cables up to 33 kV, and other electrical equipment associated with modern power stations.

Experience in the preparation of specifications and estimates and preparing reports on tenders will be a recommendation.

Salary will be within Class AX/EX, Grade 4 (£1,145-£1,410 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 16th April, 1958.

OPERATION AND EFFICIENCY ENGINEER, CASTLE DONINGTON POWER STATION
(Vacancy No. 57/58/ER).

Candidates should have wide experience of the operation and maintenance of a large modern power station with P.F. boiler plant. The successful applicant will be responsible to the Station Superintendent for ensuring that all sections of the plant attain the specified efficiency and for the carrying out of special investigations and tests.

The possession of the Higher National Certificate or equivalent would be an advantage.

Salary will be in accordance with Class L, Grade 6 (£1,325-£1,415 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 16th April, 1958.

These appointments will be pensionable under the terms of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

L. F. JEFFREY,
Divisional Controller.

26th March, 1958. 2964

THE BARBADOS LIGHT & POWER COMPANY LTD.

Vacancies for Charge Engineers

THE BARBADOS LIGHT & POWER Company Limited has vacancies for CHARGE ENGINEERS at its Generating Station at Bridgetown, Barbados.

Applicants should have experience in the operation of modern steam turbines, water tube boilers and diesel generators, and must have Graduate Membership of the I.E.E. or I.Mech.E. or Associate Membership of the I.Mar.E. or the Higher National Certificate in Mechanical Engineering or Second Engineer's M.O.T. Diesel and Steam Certificate or R.N. equivalent.

The annual salary is £1,200 rising by annual increments of £25. Rent free furnished accommodation is provided and successful applicants will be included in the non-contributory pension and insurance schemes and will qualify for free medical attention.

First class passages to Barbados will be provided for the successful applicant, his wife and two children up to the age of 16. First class leave passages to the United Kingdom will be provided every three years.

Information on Barbados can be obtained from the West India Committee, 40, Norfolk Street, London, W.C.2.

Applications giving full details of qualifications, age, experience, etc., together with two recent testimonials, should be sent to the Secretary, The Barbados Light & Power Co. Ltd., Suffolk House, Laurence Pountney Hill, Cannon Street, London, E.C.4. 2984

BRITISH INSULATED CALLENDER'S CONSTRUCTION CO. LTD.

carrying out overhead equipment contracts for Railway Electrification in the Crewe area require:

FIELD SURVEYORS AND DRAUGHTSMEN.

For the work of track survey, men with Mining or Ordnance Survey experience would be preferred. The Draughtsmen interpret the work of the Field Surveyors to produce layout plans and also details associated with overhead current collection equipment.

This is important and interesting work with excellent conditions of employment. The company will be operating in this area (Crewe/Manchester) for several years and can offer continuity of employment to those willing to accept a change of location on completion of this work.

Application giving details of age, qualifications and experience should be addressed to:—

The Resident Engineer,
B.I.C.C. Construction Co. Ltd.,
c/o Railway Electrification Construction Depot,
Loco Works Entrance,
Wisaston Road, Crewe.

2977

SOUTHERN ELECTRICITY BOARD

Installation Engineer

Weymouth District of No. 4 (Bournemouth) Sub-Area. Salary N.J.B. Class E, Grade 8 (£790 × £15 to £835 per annum). N.J.B. conditions of service.

Applicants should be qualified to accept responsibility for all installation and maintenance work in the District and its Branch, and to collaborate with the Development Engineer and District Commercial Engineer in the preparation of estimates for contracting work, particularly those of an exceptional nature.

Applications on forms obtainable from the Sub-Area Secretary, 1, Priory Road, Bournemouth, and returned to him in envelopes suitably endorsed not later than 14th April, 1958.

Assistant Engineer (Maintenance and Operation)

Reading District of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class H, Grade 11 (£790 × £15 to £835 per annum). N.J.B. conditions of service.

The duties of the post will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, Berks, and returned to him, in envelopes suitably endorsed, not later than 14th April, 1958.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. 2976

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

APPLICATIONS are invited for the post of SENIOR DRAUGHTSMAN, Section Leader Grade, in the Mechanical Engineering Section of the Drawing Office of the Midlands Project Office. The present location of this office is at Wolverhampton, but will be ultimately centred on Birmingham. N.J.B. service conditions, superannuable appointment, salary according to experience and qualifications, within Schedule D, Grade 3 of the Agreement, £1,020 × £20 to £1,120.

Applicants should have received a sound technical education and practical training and should be particularly experienced in the layout of turbine house plant associated with generating stations. A general knowledge of generating station layout will not be considered sufficient as the successful applicant will be primarily engaged on the development of turbine house and H.P. pipework layouts.

Possession of a Higher National Certificate in Mechanical Engineering will be considered an advantage. Good conditions of employment, holiday and sick pay schemes.

Apply, quoting vacancy number 771MD, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 22nd April, 1958. 2963

MECHANICAL AND ELECTRICAL ENGINEERS IN GOVERNMENT DEPARTMENTS

PENSIONABLE posts for men and women under 35 on 1st March, 1958, with extension for regular Forces service, Overseas Civil Service, established civil service or temporary service as mechanical or electrical engineers in Government Department.

Applicants must either have (or obtain in 1958) Degree in Engineering or Physics (or Diploma of Technology for some posts), or have passed examinations necessary for a professional qualification (e.g., A.M.I.Mech.E., A.M.I.E.E., A.F.R.Ae.Soc., etc.). Exceptionally, evidence of high professional attainment acceptable in place of qualifications. Practical training and experience normally required, but untrained graduates acceptable for some posts.

Men's starting salary from £755 (lower if under 25) to £1,085. Maximum (London) £1,250. Promotion prospects to posts on maxima (London) of £1,720 and £2,050.

Write Civil Service Commission, 30, Old Burlington Street, London, W.1, for application form, quoting No. S.85/58. Closing date 15th April, 1958. Earlier applicants may be interviewed before that date. 2905

ROYAL NAVAL SCIENTIFIC SERVICE

PHYSICISTS, ELECTRONIC ENGINEERS and MATHEMATICIANS required for 25 Senior Scientific and Scientific Officer posts at establishments in London area, Baldock, Harwell, Haslemere, Poole, Greenock and Rosyth. Also MECHANICAL ENGINEER for work on heat transfer problems at Harwell. MECHANICAL ENGINEER for work on fuel and lubricating oil problems in London area. MECHANICAL ENGINEER for work on gas turbine problems in London area. CHEMICAL ENGINEERS for London area and Poole. METALLURGISTS for Rosyth and Poole. CHEMISTS (physical and inorganic) for Poole and Baldock.

Candidates must normally be natural-born British subjects of natural-born British parents, with at least First or Second Class Honours degrees or equivalent high professional attainments. S.S.O.s must have had at least three years' postgraduate experience and be 26 years of age.

Salaries (men): S.S.O. £1,190-£1,410; S.O. £635-£1,110 (London); somewhat lower in Provinces. Appointments are unestablished (with F.S.S.U. benefits), but opportunities may occur for those under 32 to compete for established posts.

Forms from M.L.N.S., Technical & Scientific Register (K), 26, King Street, London, S.W.1, quoting A.98/8A. 2807

POWER SYSTEMS

SENIOR RELAY APPLICATION ENGINEER

ENGLISH ELECTRIC COMPANY LTD.
STAFFORD

The company wishes to appoint a senior engineer with experience in power systems relay application, testing and commissioning.

Applicants should hold a good degree or equivalent qualifications in electrical engineering.

This is a monthly staff appointment and after one year's qualifying service carries three weeks' holiday and entry into the staff pension scheme.

Assistance with housing will be given where possible.

Write giving full details to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting ref. ER1218V. 2953

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

No. 4 Sub-Area

THIRD ASSISTANT ENGINEER (Buildings) required in the Board's No. 4 Sub-Area Headquarters, Electricity House, Rhostyllen, near Wrexham. Salary within the range £885/£930 per annum (N.J.B. X.11).

Applicants should have experience of the design, construction and maintenance of buildings and associated works and the preparation of drawings and specifications. Technical qualifications desirable.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager at the above address. Closing date 18th April, 1958. 2974

ELECTRICAL ENGINEERS
(Laboratory)

APPLICANTS must have at least H.N.C. with experience of development work on small electro-mechanical devices. Time-switch experience an advantage but not essential. Salaries and conditions of these staff vacancies are in line with the requirements.

Please apply in writing, giving details of past experience and salary required, marking your application "Confidential," to :—

The Personnel Manager
VENNER LIMITED
Kingston By-Pass, New Malden, Surrey
2955

PORT OF LONDON AUTHORITY

PORT OF LONDON AUTHORITY invite applications for the position of ASSISTANT ENGINEER (Electrical), Chief Engineer's Department, Head Office.

Salary scale £1,265 rising by annual increments to £1,715 per annum, with commencing rate according to age and experience.

Candidates, who must be British subjects and Corporate Members of the Institution of Electrical Engineers, should have served a recognised apprenticeship with one of the major electrical manufacturing firms and should have experience in the specification, installation, operation and maintenance of the electrical equipment of a dock or harbour undertaking or heavy industrial organisation, including H.V. and L.V. distribution systems, rectifying plant, A.C. and D.C. cranes and pumping plant, large lighting schemes and V.H.F. radio-telephony. Preference will be given to candidates not over 40 years of age.

The successful applicant will be required to become a member of the Port Authority's contributory superannuation scheme. In certain cases existing pensionable service is transferable.

Application forms may be obtained from the Establishment Officer, Port of London Authority, Trinity Square, London, E.C.3.

2940

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:—

Central Gloucestershire Sub-Area
WAYLEAVE OFFICER
(Severn Vale).

Duties include surveying and plotting of routes and assisting in the negotiation and preparation of wayleave agreements, etc. Salary per annum £500/£600. N.J.C. Grade 1.

Apply by letter, within 14 days, stating age, present employment and details of experience to Sub-Area Manager, Midlands Electricity Board, 126, London Road, Gloucester.

Shropshire and Herefordshire Sub-Area
SENIOR ASSISTANT
(Purchasing Department) (Headquarters).

Duties will include all aspects of work in connection with purchasing, records and statistics. Salary £765/£840 per annum. N.J.C. Grade 4. Appropriate qualifications desirable.

Apply by letter, within 14 days, stating age, experience, etc., to Mr. W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary.
2982

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SECOND ASSISTANT ENGINEER (Operation and Maintenance) required in the Board's No. 4 Sub-Area Headquarters, Electricity House, Rhostyllen, near Wrexham. Salary within range £1,160/£1,235 per annum (N.J.B. K/7).

Previous experience in system operation, preparation of load flow diagrams, fault localisation, relay testing and the design, construction, operation and maintenance of H.V. and L.V. underground and overhead distribution systems and substation plant would be an advantage. Technical qualifications preferable.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager at the above address. Closing date 15th April, 1958. 2951

ADELAIDE, SOUTH AUSTRALIA

Electrical Hand Tools Salesman

SALES REPRESENTATIVE required for Adelaide area by Harris, Scarfe Ltd., large old-established merchant company. The position requires detailed knowledge of electrical hand tools and good experience in selling to industrial users.

Excellent prospects, nominated passages, housing provided, pension scheme.

Write, giving age, married state, training and experience, and with copies of testimonials, to Davis & Soper Ltd., 52 & 54, St. Mary Axe, London, E.C.3. 2944

THE INSTITUTION OF ELECTRICAL ENGINEERS

Editorial Vacancy

THERE is a vacancy for an EDITORIAL ASSISTANT for work on the PROCEEDINGS of the Institution. The qualifications required are an engineering or a science degree, some engineering experience, and the ability to sub-edit high-class technical copy. A knowledge of foreign languages would be advantageous.

Applicants should be between the ages of 25 and 30 (approx.). Progressive post, with commencing salary commensurate with age and experience. A superannuation scheme similar to the F.S.S.U. covers the appointment.

Those who are interested should apply by letter to the Secretary, The Institution of Electrical Engineers, Savoy Place, London, W.C.2, giving full particulars of their education, training and experience. 2950

JOSEPH LUCAS
(ELECTRICAL) LIMITED

Great King Street, Birmingham, 19

ENGINEER

EXPANSION of development of ignition equipment for gas turbines and allied projects creates a vacancy for a practical engineer with experience of design for economic production of electrical apparatus. The work is of a high technical standard and applicants should preferably possess an honours degree.

The post is permanent and pensionable and offers considerable scope for advancement to a progressive engineer.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/190.

128

ASSISTANT FOREMAN (CONTROL)

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY, Industrial Group, requires a Technician at Calder Works, Calderbridge, Cumberland, to be responsible, on shift, to a foreman for the control of turbo-alternators and the electrical distribution system associated with a nuclear power station.

A recognised engineering apprenticeship is essential, whilst experience of the duties described is desirable. Possession of an appropriate O.N.C. or equivalent may be an advantage.

Salary £700 (at age 26) to £875.

Contributory pension scheme.

A house or assistance towards legal expenses on house purchase may be available.

Send postcard for application form, quoting reference 2366, to Works Secretary, U.K.A.E.A., I.G., Windscale Works, Sellafield, Calderbridge, Cumberland.

Closing date 21st April, 1958. 2941

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following positions in the Western Sub-Area of the Board :—

(a) ASSISTANT ENGINEER, District 101/102 (Haverfordwest). Salary Class D, Grade 10 (£635/£680).

(b) ASSISTANT ENGINEER, District 101/102 (Haverfordwest). Salary Class D, Grade 9 (£685/£730).

(c) Two ASSISTANT ENGINEERS, District 105/106 (Carmarthen). Salary Class D, Grade 9 (£685/£730).

The salaries mentioned above are in accordance with the National Joint Board Agreement.

Applications stating age, present position and salary, qualifications, experience, and three referees, should be addressed to the Secretary (Establishments Section), St. Mellons, Cardiff, so as to reach him not later than Monday, 14th April, 1958. 2952

Situations Vacant (continued)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

GENERAL ASSISTANT ENGINEER (Technical Records) is required at Stourport "A" and "B" Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K.14, £740-£785 per annum.

Applicants should have received sound technical and practical training, and should be interested in statistics, calculations and the maintenance of technical records. Appropriate qualifications will be an advantage.

Apply, quoting vacancy number 773MD, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 22nd April, 1958. 2962

ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL

requires an apprenticed or similarly trained TECHNICIAN to place and progress contracts for prototype and experimental engineering equipment. This involves technical planning, cost estimates and technical liaison. Experience of contract and manufacturing problems desirable.

Salary £875 (at 30) to £1,050.

Housing, superannuation and excellent conditions.

Send POSTCARD to Recruitment Officer (1081/48, A.E.R.E., Harwell, Didcot, Berks., for application form and details. 2945

SOUTH EASTERN ELECTRICITY BOARD

FOURTH ASSISTANT DISTRICT ENGINEER, Croydon and Purley District. Annual salary £830 × £15 to £885, including London Area allowance under N.J.B. Class H, Grade 11. Superannuable.

Applicants should be suitably qualified and have practical experience in E.H.V. and L.V. three and single-phase distribution.

Applications, naming two referees, on forms from H. Lowe, M.I.E.E., District Manager, Seeboard, Electric House, Wellesley Road, Croydon, by 16th April, 1958.

G. WRAY,
Secretary. 2975

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT ENGINEER (Planning) in the Western Sub-Area of the Board, based at Tenby.

Salary Class G, Grade 10 (£790/£835) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience, and three referees, should be addressed to the Secretary (Establishments Section), St. Mellons, Cardiff, so as to reach him not later than Monday, 14th April, 1958. 2942

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER (Mains) in District 462 (Newport) in the Eastern Sub-Area of the Board.

Salary Class G, Grade 12 (£685/£730) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience, and three referees, should be addressed to the Secretary (Establishments Section), St. Mellons, Cardiff, so as to reach him not later than Monday, 14th April, 1958. Previous applicants will be considered and need not re-apply. 2943

THE JACKSON ELECTRIC STOVE CO. LTD.

Dallow Road, Luton, Beds

require a DEMONSTRATOR for their London branch. Preferably with E.A.W. Certificate. Must be thoroughly experienced in cooking, lecture demonstrating and in the sale of apparatus. Age not under 23.

Applications giving full particulars of previous experience, which will be treated in the strictest confidence, should be addressed to the Personnel Executive at the above address. 2954

CLASSIFIED ADVERTISEMENTS ARE PREPAID

SALES REPRESENTATIVE

for manufacturer required for W. and N. Lancs., N. Wales, living within 20 miles Liverpool. To promote sales of "Ashley" Guaranteed Electrical Installation Accessories. Would suit hardworking enthusiast having electrical experience and connections with electrical trade, etc., in area.

Salary, commission, expenses, pension scheme. Car provided.

Full letter describing qualifications, career, age, home telephone number, confidentially to Sales Director, Ashley Accessories Ltd., Ulverston, Lancs. All acknowledged. 2833

A PROGRESSIVE and expanding firm of electrical wholesalers have decided to appoint additional representation. The successful applicant will be required to cover an area of approximately 25 miles radius of Watford and will be given every possible support. Remuneration will be by salary and commission, and transport will be provided. Apply in writing giving details of experience, etc. — Russell's Supplies Ltd., Loates Lane, Watford. 2966

ALUMINIUM LABORATORIES Limited, research and development organization of the Aluminium Limited Group, have a vacancy for an electrical engineer to develop and test the application of aluminium and its alloys in prototype electrical equipment (emphasis on insulated cables, overhead line conductors and transformers). Applicants should possess H.N.C. or Corporate Membership of I.E.E. The post carries a large measure of responsibility and requires initiative and organizing ability. Pension and life assurance scheme in operation. Apply to Personnel Officer, Aluminium Laboratories Limited, Banbury, Oxon. 2965

AN electrical engineer (H.N.C.) is required by J. A. Crabtree & Co. Ltd. for development work in their electrical laboratory. Apply in writing to the Secretary, J. A. Crabtree & Co. Ltd., Lincoln Works, Walsall. 2979

ASSISTANT electrical engineer required for contract work involving power cable installations and overhead line construction on sites in U.K. Excellent opportunity for young man willing to travel. Applications giving age and training to—Employment Manager, Johnson & Phillips Limited, Victoria Way, London, S.E.7. 2797

CATERING equipment. The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2, requires a technical sales assistant in the cooking and baking department. Candidates, preferably aged 27-33, must have a sound knowledge of the catering industry, some sales experience, and an appreciation of electrical catering equipment. Applications should be addressed to the Staff Manager (Ref. IH). 2947

CONSULTING engineers require urgently junior electrical draughtsmen conversant with lighting and power designs for industrial building schemes. Good conditions, site visits, non-contributory pension scheme, bonus scheme, luncheon vouchers, etc. Write or phone—Messrs A. F. Myers & Partners, 147, Victoria Street, London, S.W.1 (Tat. 8241). 2849

CONTROL gear engineer required, age 23-35, for layout and circuiting of contactor equipment. Good salary. Permanent and progressive position. Canteen, pension scheme. Write stating age, experience and qualifications, if any, to Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 273

DEWHURST & PARTNER Ltd., of Suffolk House, Suffolk Street, Birmingham, require the services of an area manager. Successful applicant must have a wide technical and commercial knowledge of motor control gear applications and a proven record of technical selling ability. Senior appointment. Car provided. Apply in first instance to the Regional Manager, at the above address, stating age, qualifications, selling experience and approximate salary required. 2897

DEWHURST & PARTNER Ltd. require technical estimator for preparing tenders in their estimating engineering department. Applicant must have good electrical engineering background and have basic knowledge of motor control equipment and its applications. The position is a senior one, and housing assistance will be given to successful applicant if necessary. Canteen facilities, pension scheme. Write giving age, experience, etc., to — Personnel Officer, Dewhurst & Partner Ltd., Inverness Works. Inverness Road, Hounslow, Middlesex. 274

DRAUGHTSMAN, about 30 yrs., for light engineering in Wimbledon area. Workshop experience essential and electrical knowledge an advantage. Five-day week. Free pensions scheme. Write, stating age, experience and salary required, to—Box 2956.

DRAUGHTSMAN for office in Bayswater. Work mostly on electrical installations and layout for retail shops. Five-day week. Canteen. Salary according to age and experience. Apply to — Chief Engineer's Dept., United Dairies Ltd., Cumberland Avenue, Park Royal, London, N.W.10. 2896

DRAUGHTSMAN required by progressive firm for interesting work mainly in connection with electrical rotating machines and associated equipment. The position offers good prospects and a non-contributory life assurance and pension scheme is in operation. Apply giving full details of experience to — Arthur Lyon & Co. (Engineers) Ltd., Park Works, Stamford, Lincs. 2898

DRAUGHTSMAN required, preferably with experience of medium voltage metalclad switchgear. Bonus scheme and non-contributory superannuation scheme in operation. Housing assistance available to successful applicant. The company is in pleasant country surroundings within six miles of the South Devon coast. Write stating experience, age, etc., to—Ottermill Switchgear Ltd., Ottery St. Mary, Devon. 2850

ELECTRICAL engineer with maintenance experience of H.T. and L.T. distribution, light and heavy motors, automatic control gear, lighting and power. Details of age, qualifications, experience and present salary to—Box 2948.

ELECTRICAL engineers, junior and senior, required for consulting engineers' office in London. Salary £600-£900 depending upon age, qualifications and experience.—Box 160.

ELECTRICAL test superintendent required by rubber and plastic cable makers, London area. Pension scheme. Write stating age, experience and salary required.—Box 2967.

ELECTRO-mechanical draughtsmen required for production drawing office of company engaged in the manufacture of control gear equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middx. 275

ENGINEER (basic grade) required by Atomic Weapons Research Establishment, Aldermaston, Berks, to plan new works construction, including radio-active and conventional laboratories and workshops with ancillary plant and services; to co-ordinate mechanical, electrical and civil design efforts, and to prepare contractual specifications. A recognised apprenticeship or equivalent required and Corporate Membership of the Institution of Civil, Mechanical or Electrical Engineers, or exempting qualifications. General experience of building construction necessary, including installation of services and plant, and knowledge of ventilation advantageous. Salary £815 (at age 25) to £1,110 (at age 34 or over) to £1,270 p.a. Contributory superannuation scheme. A house or assistance towards legal expenses on house purchase will be available for married officers living beyond daily travelling distance. Postcards for application forms to the Senior Recruitment Officer at above address. Please quote Ref. 1761/48. 2946

ENGINEERS required for the erection of lattice tower and wood pole overhead transmission lines, willing to serve either at home or overseas. Applicants should have a technical background up to H.N.C. (Electrical) standard. Experience desirable but not essential. Pension fund. Write giving full particulars and quoting reference C/76/55 to—Personnel Officer (Staff), British Insulated Callender's Construction Company Limited, 30, Leicester Square, London, W.C.2. 175

ESTIMATOR required by the overhead line contracts department in London. Responsible position in which some knowledge of overhead line construction desirable but not essential. Minimum age 25 years. Five-day week, pension fund, staff canteen. Salary according to qualifications and experience. Apply in writing to Personnel Officer (Staff), British Insulated Callender's Construction Company Limited, 30, Leicester Square, London, W.C.2. 2968

J. A. CRABTREE & Co. Ltd., Walsall, require for their South African factory an electrical engineer with experience in the manufacture of control gear. This is an excellent opportunity with wide scope for a man with initiative who will work directly under the works manager. Please reply giving personal details and details of experience to the Technical Director, J. A. Crabtree & Co. Ltd., Lincoln Works, Walsall. 2978

MECHANIC required for West Africa. Applicant should be capable of installing and servicing general electrical equipment, including refrigerators and air conditioning units; also adaptable to servicing motor cycles and motor scooters, etc. Reply stating age, family circumstances and full details of experience.—Box 2867.

OPPORTUNITY offered to young man, under thirty, with electrical background to join the sales staff of an established firm of electric motor manufacturers in London.—Box 2817.

SALES order clerk required. Senior post, well paid position offering scope in the future. Superannuation scheme, canteen and social club facilities. Experience of electrical wholesaling essential. Apply to — Managing Director, Halsey's Electric Co. Ltd., Brandon House, Wyfold Road, London, S.W.6 (Fulham 3355). 2949

SENIOR draughtsman required for progressive company of electrical/mechanical engineers, with experience on L.T. switchgear and fuseboards. Apply Chief Draughtsman, Peppers of Woking Ltd., Stanhope Road, Camberley, Surrey. 2774

SENIOR electrical designer required for A.C. and D.C. machines in sizes ranging from fractional to about 100 h.p. Write in confidence, giving age, experience and salary required, to—Box 2853.

SENIOR electrical draughtsman required with experience in the field of general distribution and utilisation. Qualifications and experience should be to Higher National standard or equivalent. A younger person with O.N.C. or equivalent could be considered for a junior electrical draughtsman post provided he has potential. The company operates a non-contributory pension and insurance plan. Apply by letter to the Personnel Department, Kodak Ltd. (Factories), Harrow, Middx., quoting DGD/1. 2957

SENIOR electrical draughtsman required with experience of schemes for H.V. and M.V. distribution for heavy industry, illumination and equipment for industrial building. Applicants should be qualified to H.N.C. standard. Salaries are assessed in accordance with age, qualifications and experience, and will be reviewed annually. Contributory superannuation and widow's pension funds are in operation, and there are excellent canteen, welfare and recreational facilities. Applicants should apply in writing to the Chief Engineer, Pilkington Brothers Limited, Cowley Hill Works, St. Helens, enclosing a brief history of their career and details of their education and qualifications. 2875

SITE supervisors, cable foremen, jointers and mates required for cable installation contracts throughout the country.—Box 2879.

SUPERVISING electrical engineer required for progressive electrical contractors in Bedfordshire and Hertfordshire. State full experience, salary required, to—Box 2958.

SURVEYOR required for wood pole line contract in Inverness area. Good salary and subsistence to right man. Apply in writing to—B. French Limited, Pike Mills, Kidderminster. 2802

TECHNICAL sales assistant required with practical and theoretical experience of electrical engineering for sales office of manufacturer of electric arc welding equipment. Pension, canteen, welfare facilities, five-day week. Apply Murex Welding Processes Ltd., Hertford Road, Waltham Cross, Herts. 2881

TESTER of automatic electric control equipment required. Interesting work with good prospects. O.N.C. standard preferred. Five-day week, pension scheme, canteen facilities. Please write giving full details of age, previous experience, qualifications, etc., to — Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 277

TRANSFORMER representative for the electronic and industrial transformer fields. Preference will be given to a person already engaged in a similar capacity. Salary plus commission. Car will be supplied.—Box 310.

YOUNG man, aged about 25, of good education, with sound electrical training, required as technical representative for the sale of resistance alloys. Excellent prospects for the right man. Apply—General Sales Director, Hall & Pickles Ltd., Manchester, 1. 2900

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

BRITISH electrical engineer at present contracts manager with agents in India for U.K. manufacturers, becoming available due to import restrictions. Prepared to travel home or abroad. Please use air mail stationery when replying.—Box 9317.

DIESEL engineer (44), wide experience marine and power station engineering, requires post as maintenance engineer anywhere in London area. — J. R. John, 28, Richmond Crescent, Haverfordwest, Pembrokeshire. 9314

ELECTRICAL contractor (Scot), over twenty years' experience in the installation and service of leading makes of electrical and radio equipment. Member of R.T.R.A. on N.R.E.I.C. Disposing of business and emigrating to Australia in autumn; desires part or full-time representation on technical sales and service in N.S.W. for British manufacturer, or similar post calling for initiative and integrity. —Box 9322.

ELECT. eng. desires appointment with contractors. Preparation of schemes, estimating, supervision; from tender stage to completion (London area). —Box 9306.

ELECTRICAL engineer, 45, Assoc.I.E.E., experienced electrical supply authority, industrial applications, installations and administration, seeks position south or south-west England. At present in Canada. Available for interview summer or earlier if necessary.—Box 9323.

ELECTRICIAN (supervisor) desires o/seas contract, A.C.-D.C. generation, transmission, hospitals, factories, lifts, etc. Extensive experience, including testing.—Box 9304.

FULLY experienced wholesale order clerk requires position with responsibility where enthusiasm counts.—Box 9321.

MAINTENANCE technician (electrical) desires position of service engineer requiring skill and keen assessment, experienced industrial instruments/gear. London area or Southern Counties. Age 32. Own car or works vehicle. —Box 9312.

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A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- Slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

ALTERNATORS from ½ to 675kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, generators, 1-100 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

BARGAINS in electric motors are always being obtained from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Stocks include A.C. and D.C. motors, second-hand and new up to 30 h.p. Starters, slide rails and pulleys. Ring Mon. 3355 for your requirements. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (EALing 3155/6). 117

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists.—Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards. — Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONVERTERS and motor-alternators, 24, 110 and 220 v. D.C. to 230/1/50 A.C., 125 watts to 6 kVA in stock.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

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DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

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ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E.R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 111

FLUORESCENT tubes reconditioned and guaranteed as new for 7s. 6d. each. Free collection and delivery in Lancs and Yorks.—The Anglo-American Electrical Company, Bury New Road, Breightmet, Bolton, Lancs. (Telephone, Bolton 7251). 212

FREQUENCY changers and variable frequency M/A sets in stock, and to specification.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 148

GENERATING plants of all types, new and reconditioned up to 100 kVA in stock. Special plants built to order at short notice; automatic mains failure, etc.—Powerco Ltd., 312, York Rd. London, S.W.18 (VAN. 5234). 151

GENERATING sets for sale, petrol, diesel and steam, from 1 kW up to 700 kW. A.C. and D.C. switchboards.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 163

HIGH frequency alternators and converters, 400 to 2,600 cycles up to 6 kVA in stock. Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 149

HOUSE service meters, C. & H., Aron, E.A.C., 20-240 v. A.C., 1-ph., 50 c., 5 amps., 17s. 6d.; 1s. 6d. postage.—Universal Electrical, 217-221, City Rd., London, E.C.1. 37

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTOR generators of all types in stock and to specification up to approx. 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 152

MOTORS, starters, circuit breakers. Huge stocks of all types, ½ to 300 h.p. Stock list or quote by return.—J. S. Ramsbottom & Co. Ltd., Bow St., Keighley (3774-5-6). 70

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading. — Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. or D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 36

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QUARTERLY Credit Meters, single & poly-phase, 2½-100 amps. From 17/6d. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes; enquiries invited. — Universal Electrical, 221, City Road, London, E.C.1. 34

SLYDLOK fuses for sale.—Ryness Supplies, 37, Goodge Street, London, W.1. 284

SMALL BR screws and nuts in steel, brass and stainless steel, from stock.—Premier Screws & Repetition Co. Ltd., Woodgate, Leicester. 180

SURPLUS Pyrotenax cable, from 1 × .04, 2 × .003 to 1 × .0145. List on application. Nett trade, less 10%.—Truman Elec. Co. Ltd., 40, Bridge St., Walsall (Tel. 2198). 2902

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SYSTOFLEX yellow sleeving. Thousands of yard lengths available in 3½, 6, 7, 11, 12, 13, 22, 25 mm. sizes at clearance prices; also Henley's ½" pure rubber tape. Keen prices quoted for ebonite, loaded ebonite and Tufnol sheets, rods and tubes. Natural grey and ebony grades or Sindanyo sheets also available.—J. H. Elsby, Market Street West, Birkenhead (Tel. 8966). 2959

TELEVISION slotmeters & Time Switches. Details from: Tradex Meter Co., Surbiton. Elmbridge 4487. 172

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

WARD Leonard motor generator sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

400-cycle to 1,500-cycle motor alternators and alternators.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 27

1,500-cycle alternators, 80 v., 25 amps.—E.W.S. Co., 69 Church Road, Moseley, Birmingham. 9242

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GENERATING set hire service. Consult the most experienced firm for A.C. and D.C. units from 2 kW to 240 kW, diesel or petrol, stationary or mobile, sale or hire. 24-hr. breakdown service. — Dawson-Keith Ltd., Hillview Rd., Sutton, Surrey (Fairlands 4401). 46

RELIABLE, self-contained diesel electric generating sets for hire, 2.5 to 260 kW. Night and day maintenance service. Quotations by return. — Whitetrade Limited, Rochester, Kent (Tel. Chatham 41133, 3 lines). 294

ARTICLES WANTED

HARRINGTON & Sons, reclamation contractors, want redundant A.C./D.C. electric motors and transformers, stocks of cable, etc. — 109, Beaconsfield Street, New Beckton, East Ham, London, E.6 (ALB. 1388). 315

INDUSTRIAL electric oven wanted, suitable for small spray shop. Details to Universal Sewing Machines Ltd., 27-33, Hurst Street, Birmingham, 5 (Tel. MID. 7901). 2884

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, silver and platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Rd., Watford (Tel. 5963). 114

SURPLUS laminations, enamel copper wire, screws, nuts, flex. Good prices paid. Full details to—Box 199.

TWO 300/500 kVA alternators, 400-3-50, 1,500 r.p.m. wanted.—Box 2981.

WANTED, auto transformers, 220-250 v., 50 cycles, single-phase, output 110-125 v., about 9 kVA. Reply to—Toffolo Jackson & Co. Ltd., 110, West Regent Street, Glasgow, C.2. 2960

WANTED, D.C. and A.C. ball-bearing motors. motor generator sets, dynamos and alternators. Full details to — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 13

WANTED, diesel engines and diesel sets.—H. Murfet, Daleside Rd., Nottingham. 240

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 120

WANTED, rotary converters, any sizes.—Universal, 221 City Rd., London E.C.1. 35

WANTED, surplus stock cable, all types and sizes. We can inspect.—Box 220.

250/300-h.p. reduction gear box, 1,500/60 r.p.m., wanted.—Box 2985.

WORK WANTED AND OFFERED

A.C. and D.C. motor rewinds and repairs. Prompt service, fully guaranteed.—Edgware 5566/9; Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. 92

ENGRAVED nameplates and labels in all materials. — A. T. Brown & Co. Ltd., 347-349, Katherine Road, Forest Gate, London, E.7 (Tel. Grangewood 1024). 198

SMALL armature, stator, transformer and general coil winding undertaken on production run.—Kensal Electrics Ltd., 151, Kensal Rd., London, W.10 (LAD. 4530). 202

AGENCIES

CONDUIT fittings. Agent required with wholesale connections for the Newcastle-on-Tyne and Middlesbrough area. Please give full details as to agencies held and ground covered.—Box 9319.

FRENCH firm manufacturing infra-red electric heaters seeks exclusive agent United Kingdom.—Box 9320.

MANUFACTURERS' agent, established, can offer representation to an interested manufacturer for the area from the Humber to Tweed including Cumberland, etc.—Box 9299.

BUSINESS OPPORTUNITIES

MANUFACTURERS of quality fluorescent fittings, tubes, starters and control gear wish to contact quantity buyers, wholesalers, agents, etc., interested in purchasing in quantity at special low prices. Advertisers are interested in long or short term arrangements.—Box 213.

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OLD-established electrical wholesale business in North-West England for sale.—Box 9318

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COMPANY MEETINGS

ERICSSON TELEPHONES

Increased Turnover

THE Annual General Meeting of Ericsson Telephones Limited was held on 28th March in London.

Sir Harold A. Wernher, G.C.V.O. (the chairman), in the course of his speech, said: It is a pleasure that your directors meet you with another satisfactory report. The year commenced with a good order book and business subsequently received enabled us to maintain a high level of production throughout the year. Turnover from the factories was up by 12%, but operating costs were higher, due primarily to a substantial increase in our weekly wage bill.

Last year I told you of the considerable improvements and extensions we were carrying out at our main factory at Beeston. Some of these were completed and brought into service during the year and contributed to the greater volume of production.

The U.K. must maintain a steadily expanding export of manufactured goods, and we at Ericsson's get considerable satisfaction from our own contribution to these export efforts. As for some years past, nearly half of our total production was sold overseas. The reputation which the company has built up abroad over the past half century is proving most valuable.

Referring to the accounts, we have a trading profit of £1,251,112 against £1,414,061 in 1956, which was a record year. Taxation continues to be a heavy burden on industry; in our case it takes over 53% of our trading profit. There is no question that this restricts the full development and expansion of progressive businesses, and an easing of this load would help to solve many of our present-day problems.

We have started the present year with a good order book. This is fortunate because there are indications of recession in world trade.

The report was adopted, and a final dividend of 10%, free of tax, on the enlarged Ordinary Stock, amounting to £200,012, was approved. 2971

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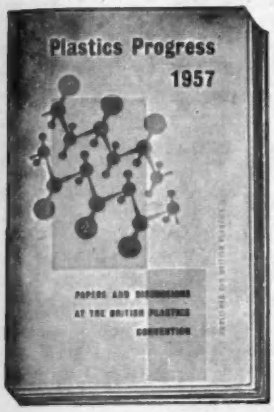

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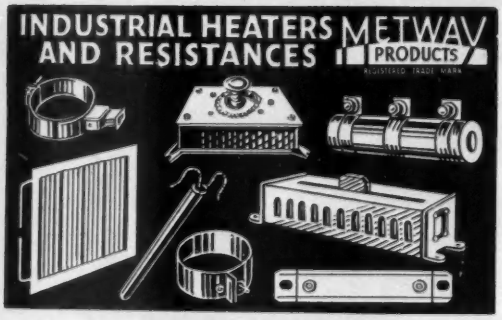

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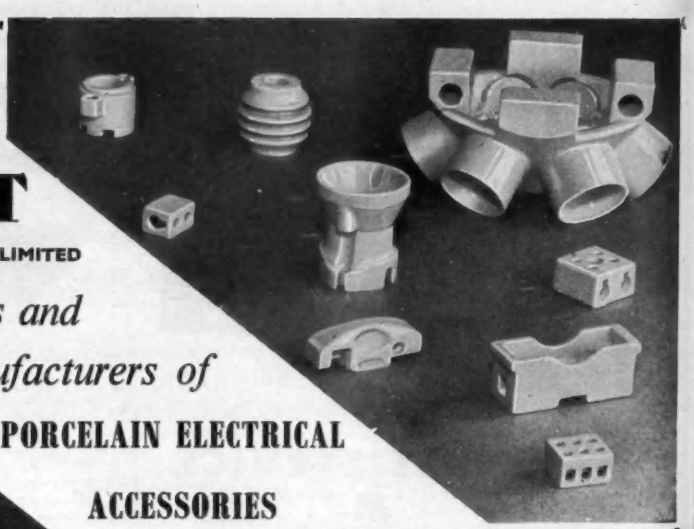

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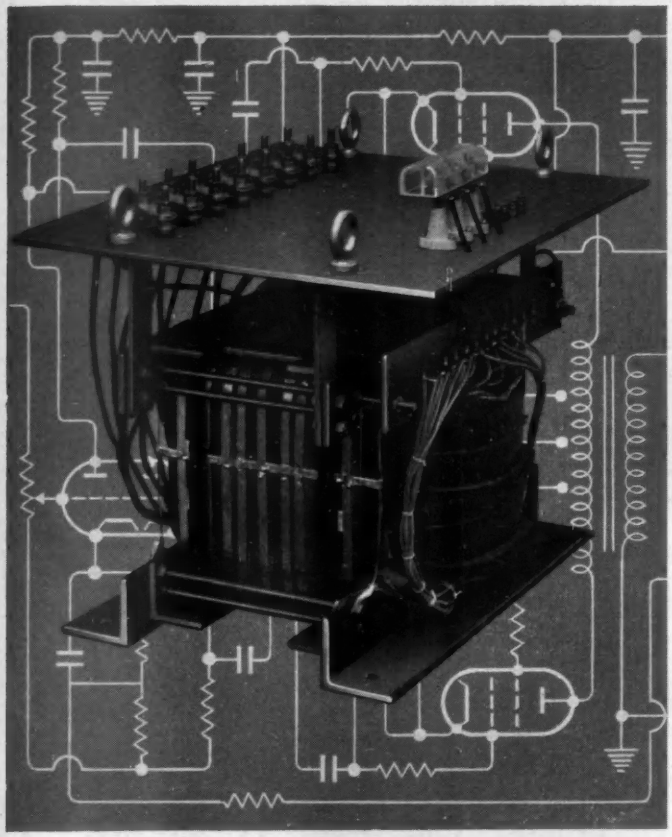

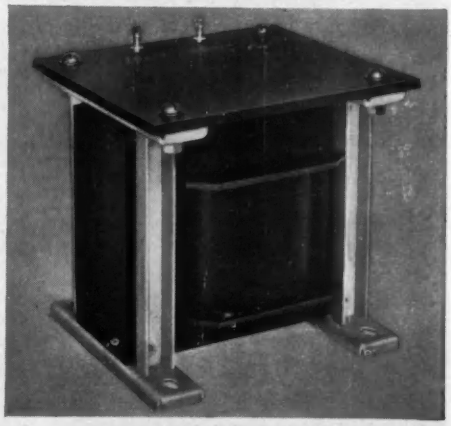

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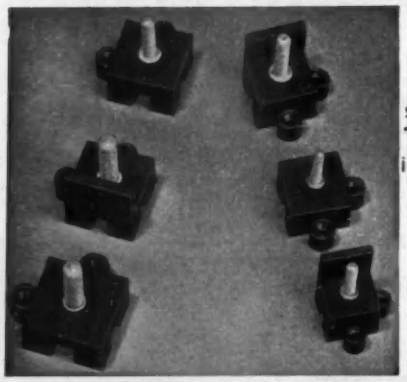

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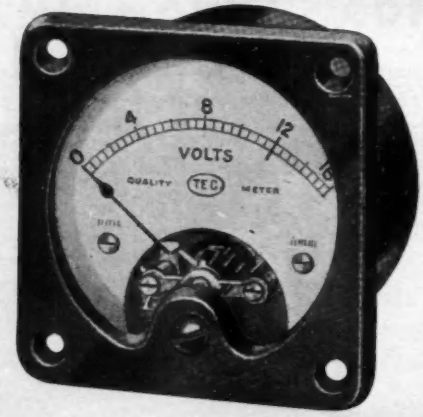

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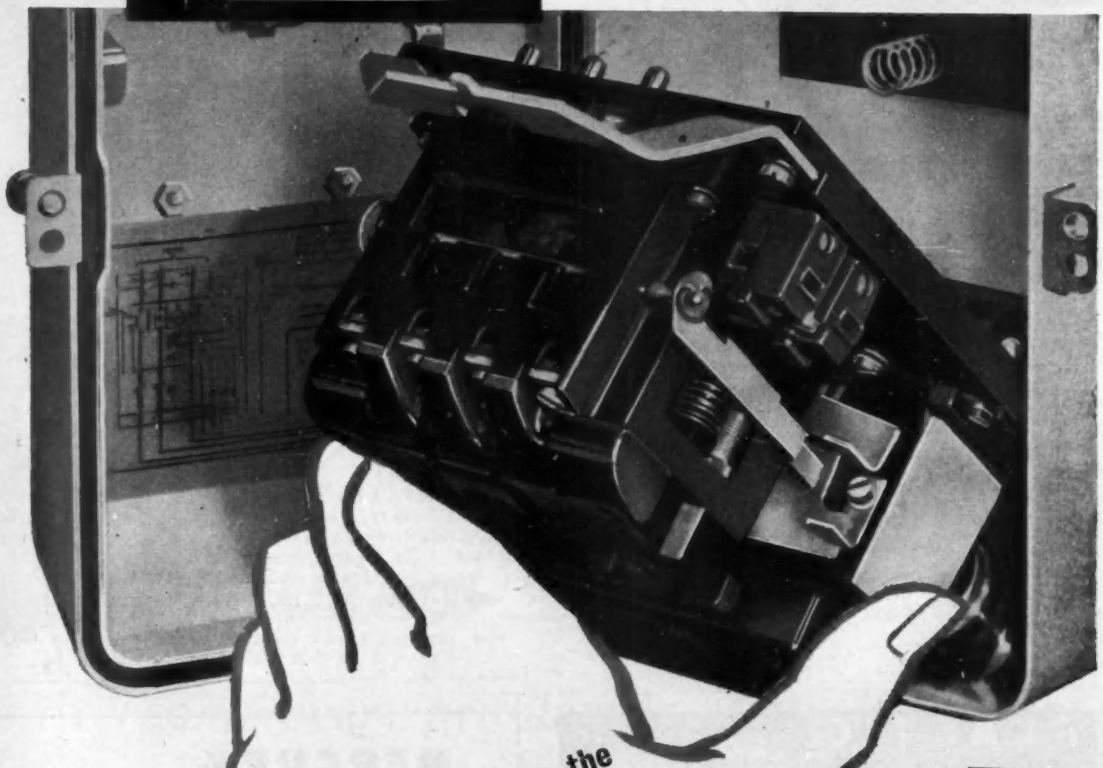

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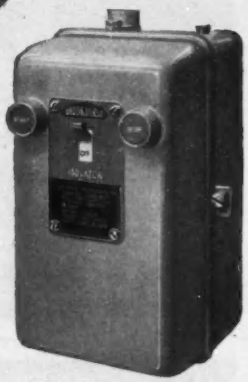

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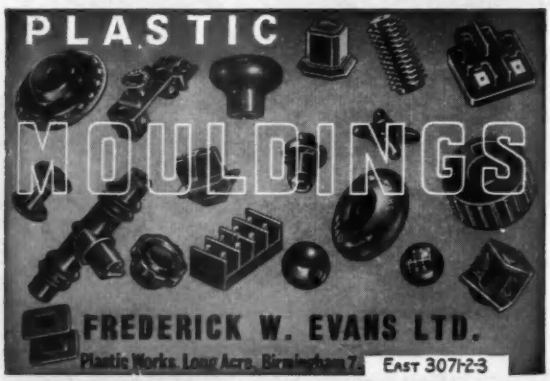

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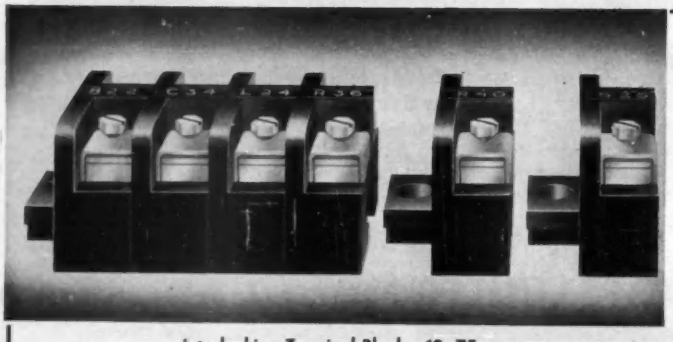

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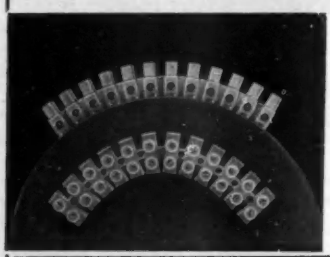

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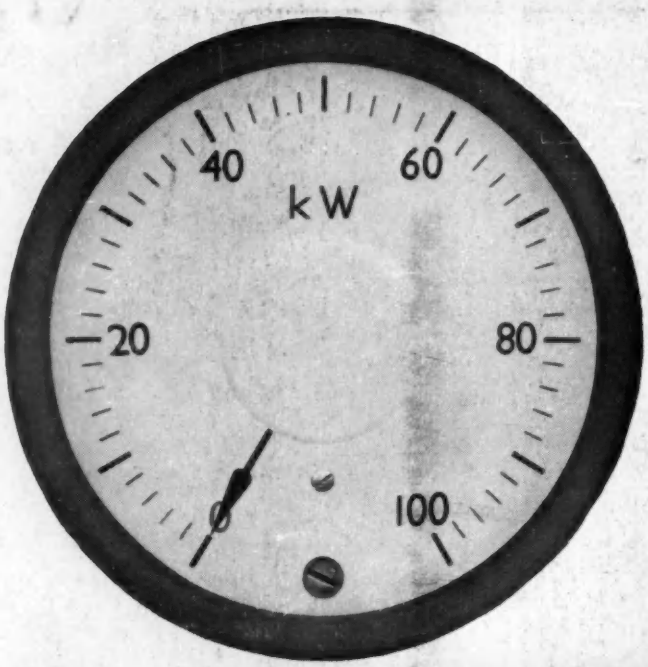

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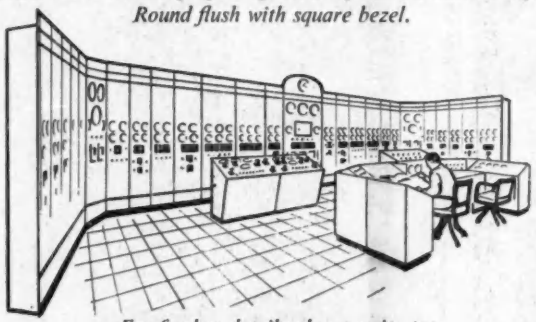

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